A-Level Biology Practice Test 1

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 is found in a prokaryotic cell but not in a typical eukaryotic animal cell?

(A) A nucleus enclosed by a double membrane
(B) Circular DNA free in the cytoplasm
(C) Mitochondria for aerobic respiration
(D) A Golgi apparatus for modifying proteins

Q2. A student measures a chloroplast as 5 micrometres long in an electron micrograph with a magnification of 10000x. What is its actual length?

(A) 0.0005 micrometres
(B) 0.05 micrometres
(C) 50 micrometres
(D) 0.0005 millimetres

Q3. Which organelle modifies, sorts and packages proteins into vesicles for secretion?

(A) Golgi apparatus
(B) Ribosome
(C) Lysosome
(D) Smooth endoplasmic reticulum

Q4. Why can a transmission electron microscope resolve structures that a light microscope cannot?

(A) It uses stains that colour every organelle differently
(B) It produces three-dimensional surface images only
(C) Electrons have a much shorter wavelength than light
(D) It magnifies specimens without any loss of contrast

Biological molecules

Q5. Which statement about water is explained by hydrogen bonding between water molecules?

(A) Water is a non-polar solvent for lipids
(B) Water has a low specific heat capacity
(C) Water has a high latent heat of vaporisation
(D) Water molecules repel charged ions in solution

Q6. Which test gives a brick-red precipitate with a reducing sugar after heating?

(A) Benedict's test
(B) Biuret test
(C) Iodine test
(D) Emulsion test

Q7. Which level of protein structure is lost first when a protein is denatured by heat?

(A) Primary structure
(B) Secondary structure
(C) Quaternary structure only
(D) Tertiary structure

Q8. Which molecule is formed by condensation between glycerol and three fatty acids?

(A) A phospholipid
(B) A triglyceride
(C) A disaccharide
(D) A polypeptide

Enzymes

Q9. Which graph feature shows that an enzyme-catalysed reaction has reached its maximum rate?

(A) A steep initial slope
(B) A line that keeps rising indefinitely
(C) A line passing through the origin
(D) A plateau at high substrate concentration

Q10. A non-competitive inhibitor binds to an enzyme. What is the effect on Vmax and Km?

(A) Vmax increases and Km increases
(B) Vmax unchanged and Km increases
(C) Vmax decreases and Km unchanged
(D) Vmax decreases and Km decreases

Q11. Why are immobilised enzymes useful in industrial processes?

(A) They denature more readily at high temperatures
(B) They can be reused and easily separated from the product
(C) They work only in a narrow pH range
(D) They are consumed during each reaction

Q12. Which change explains why most enzymes lose activity well above their optimum temperature?

(A) The tertiary structure is disrupted and the active site changes shape
(B) The substrate concentration falls to zero
(C) Peptide bonds in the substrate are hydrolysed
(D) The enzyme becomes a competitive inhibitor

Cell membranes and transport

Q13. Which component of the fluid mosaic model provides selective permeability?

(A) The phospholipid bilayer with embedded proteins
(B) Cholesterol molecules only
(C) Glycolipids on the outer surface only
(D) Water molecules in the cytoplasm

Q14. A red blood cell is placed in distilled water. What happens, and why?

(A) It shrinks because water leaves by osmosis
(B) It swells and may burst because water enters by osmosis
(C) It stays unchanged because the membrane is impermeable to water
(D) It crenates because salts diffuse out rapidly

Q15. Which process requires ATP directly to move a substance against its concentration gradient?

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

The mitotic cell cycle

Q16. During which phase of mitosis do sister chromatids separate to opposite poles?

(A) Prophase
(B) Metaphase
(C) Telophase
(D) Anaphase

Q17. What is the main significance of checkpoints in the cell cycle?

(A) They speed up DNA replication in all cells
(B) They trigger cytokinesis before mitosis
(C) They ensure every cell divides at the same rate
(D) They halt the cycle if DNA damage is detected

Q18. Which statement about cancer is correct?

(A) Uncontrolled mitosis can result from failure of cell cycle control
(B) Cancer cells always divide by meiosis
(C) Cancer is caused only by inherited mutations
(D) Cancer cells stop dividing once a tumour forms

Nucleic acids and protein synthesis

Q19. During DNA replication, which enzyme joins Okazaki fragments on the lagging strand?

(A) DNA helicase
(B) RNA polymerase
(C) DNA ligase
(D) DNA polymerase only

Q20. In eukaryotic gene control, what is the role of a transcription factor?

(A) It splices introns from pre-mRNA
(B) It binds to DNA and regulates transcription of a gene
(C) It carries amino acids to the ribosome
(D) It unwinds DNA during replication

Q21. Which event occurs during translation at the ribosome?

(A) mRNA is copied from a DNA template
(B) Peptide bonds form between adjacent amino acids
(C) Introns are removed from pre-mRNA
(D) DNA is unwound by helicase

Transport in plants

Q22. Which feature of xylem vessels adapts them for water transport?

(A) Living cytoplasm that pumps water upwards
(B) Companion cells that load sucrose
(C) Hollow, lignified walls with no end walls
(D) Sieve plates that allow bulk flow

Q23. The cohesion-tension theory states that water is pulled up the xylem mainly by which force?

(A) Transpiration pull from evaporating leaves
(B) Root pressure pushing water upwards
(C) Active transport in the phloem
(D) Capillary action in soil particles

Q24. In the mass flow hypothesis, what creates the pressure gradient in the phloem?

(A) Water entering the xylem by osmosis
(B) Transpiration from the leaves
(C) Lignin in the sieve tube walls
(D) Active loading of sucrose at the source and removal at the sink

Transport in mammals

Q25. Blood in the pulmonary vein has just left the lungs. Why is its oxygen content higher than blood in the vena cava?

(A) It comes from the pulmonary artery
(B) It comes from the vena cava
(C) It is the pulmonary vein, carrying oxygenated blood from the lungs to the left atrium
(D) It is the hepatic portal vein

Q26. Why does tissue fluid form at the arteriole end of a capillary?

(A) Solute concentration is highest there
(B) Water potential is lowest there
(C) Lymph vessels actively pump fluid out
(D) Hydrostatic pressure exceeds solute potential there

Q27. The Bohr effect describes which relationship?

(A) Increased temperature increases haemoglobin affinity for oxygen
(B) Increased carbon dioxide lowers haemoglobin affinity for oxygen
(C) Decreased pH increases haemoglobin affinity for oxygen
(D) Increased oxygen concentration lowers carbon dioxide carriage

Gas exchange

Q28. Which adaptation increases the rate of gas exchange in mammalian alveoli?

(A) A large surface area and a short diffusion distance
(B) A thick wall to prevent collapse
(C) A low blood supply to maintain a gradient
(D) A dry surface to speed diffusion

Q29. In fish, why does countercurrent flow improve oxygen uptake?

(A) It maintains a concentration gradient along the whole lamella
(B) It allows water and blood to mix directly
(C) It stops water flowing over the gills
(D) It increases the thickness of the lamellae

Q30. During vigorous exercise, which change in ventilation is expected?

(A) Decreased rate and decreased depth
(B) Decreased rate and increased depth only
(C) Increased depth but no change in rate
(D) Increased rate and increased depth

Infectious diseases

Q31. Which pathogen causes cholera, and how is it mainly transmitted?

(A) A virus spread by insect bites
(B) A fungus spread by airborne spores
(C) The bacterium Vibrio cholerae in contaminated water
(D) A protoctist spread by direct contact only

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

(A) Antibiotics cause mutations in every bacterium
(B) Resistant bacteria survive, reproduce and pass on resistance genes
(C) Resistant bacteria stop reproducing
(D) Antibiotics directly transfer plasmids between patients

Q33. A retrovirus enters a helper T cell and inserts its genetic material into the host chromosome. Which enzyme must act first for this insertion to be possible?

(A) An enzyme that infects red blood cells only
(B) Reverse transcriptase, which makes DNA from the viral RNA
(C) An antibiotic that cures the infection
(D) An enzyme spread through casual contact

Immunity

Q34. Which cells produce antibodies in the specific immune response?

(A) Plasma cells derived from B lymphocytes
(B) Phagocytes
(C) T helper cells only
(D) Platelets

Q35. Why does a secondary immune response occur faster than a primary response?

(A) Antibodies remain at high levels forever
(B) Phagocytes become permanently larger
(C) The pathogen is weaker on second exposure
(D) Memory cells remain after the first exposure

Q36. Which statement about monoclonal antibodies is correct?

(A) They are produced by many different B cell clones
(B) They bind only to non-specific antigens
(C) They are identical antibodies specific to one epitope
(D) They cannot be used in diagnostic tests

Energy and respiration

Q37. In chemiosmosis, what drives ATP synthesis in mitochondria?

(A) Direct transfer of phosphate from glucose
(B) Diffusion of oxygen across the inner membrane
(C) Breakdown of water in the matrix
(D) Flow of protons down their electrochemical gradient through ATP synthase

Q38. Where does the link reaction occur, and what does it produce from pyruvate?

(A) In the cytoplasm, producing lactate
(B) In the mitochondrial matrix, producing acetyl CoA and carbon dioxide
(C) On the cristae, producing water
(D) In the nucleus, producing glucose

Q39. Which respiratory substrate gives a respiratory quotient of 1.0 when fully oxidised?

(A) Carbohydrate
(B) Lipid
(C) Protein
(D) Ethanol

Photosynthesis

Q40. Which products of the light-dependent stage are used in the Calvin cycle?

(A) Oxygen and water
(B) Glucose and carbon dioxide
(C) ATP and reduced NADP
(D) ADP and NADP only

Q41. In the Calvin cycle, what is the role of ribulose bisphosphate?

(A) It is the final carbohydrate product
(B) It is oxidised to release oxygen
(C) It accepts carbon dioxide in carbon fixation
(D) It splits water in the light-dependent stage

Q42. A plant is kept at low light intensity but high carbon dioxide concentration. Which factor limits photosynthesis?

(A) Temperature only
(B) Light intensity
(C) Carbon dioxide concentration
(D) Water availability only

Homeostasis

Q43. Which sequence describes ultrafiltration in the kidney?

(A) Reabsorption in the loop of Henle, then secretion in the collecting duct
(B) Filtration in the distal tubule, then reabsorption in the Bowman's capsule
(C) Secretion from the glomerulus into the proximal tubule
(D) High pressure in the glomerulus forces small molecules into the Bowman's capsule

Q44. When blood water potential falls, what happens to ADH secretion and urine production?

(A) ADH secretion rises and urine volume falls
(B) ADH secretion falls and urine volume falls
(C) ADH secretion rises and urine volume rises
(D) ADH secretion falls and urine concentration falls only

Q45. Which hormone lowers blood glucose by promoting glycogenesis and glucose uptake?

(A) Insulin
(B) Glucagon
(C) Adrenaline
(D) ADH

Control and coordination

Q46. At a cholinergic synapse, what happens after acetylcholine binds receptors on the postsynaptic membrane?

(A) Sodium channels close permanently
(B) The impulse is blocked by myelin
(C) Sodium channels open and depolarisation occurs
(D) Acetylcholine is stored in the postsynaptic cell

Q47. Why does saltatory conduction in myelinated neurones transmit impulses faster?

(A) The impulse travels through the myelin sheath continuously
(B) Action potentials occur along the entire axon membrane
(C) The axon diameter is always smaller
(D) Depolarisation jumps between nodes of Ranvier

Q48. During muscle contraction, what is the role of calcium ions?

(A) They break down ATP in the sarcoplasm
(B) They expose myosin binding sites on actin
(C) They shorten the myosin filaments
(D) They prevent cross-bridge formation

Inheritance

Q49. In a dihybrid cross between two heterozygous parents (AaBb x AaBb), what proportion of offspring is expected to be aabb?

(A) 9 out of 16
(B) 1 out of 16
(C) 3 out of 16
(D) 4 out of 16

Q50. Which condition is required for Hardy-Weinberg equilibrium?

(A) Selection favouring one allele
(B) Frequent mutation
(C) A small, isolated population
(D) Random mating with no migration

Q51. A population has allele frequencies p = 0.7 and q = 0.3. What is the expected frequency of heterozygotes?

(A) 0.09
(B) 0.49
(C) 0.42
(D) 0.21

Selection and evolution

Q52. Which process is the main source of new alleles in a population?

(A) Gene mutation
(B) Independent assortment only
(C) Artificial selection
(D) Genetic drift in large populations

Q53. Which statement best describes directional selection?

(A) It favours both extremes of a phenotype range
(B) It favours the intermediate phenotype
(C) It maintains genetic diversity unchanged
(D) It favours one extreme phenotype, shifting the population mean

Q54. Allopatric speciation requires which condition?

(A) Geographical isolation preventing gene flow
(B) Gene flow between all populations
(C) Identical selection pressures in both areas
(D) No genetic variation in either population

Classification, biodiversity and conservation

Q55. Which taxonomic rank is broader than genus but narrower than class?

(A) Species
(B) Family
(C) Kingdom
(D) Domain

Q56. What does a high Simpson's index of diversity indicate?

(A) One species dominates the community
(B) Very few species are present
(C) High species richness and evenness
(D) Low genetic diversity only

Q57. Which conservation strategy protects species in their natural habitat?

(A) In situ conservation in a nature reserve
(B) Captive breeding in a zoo
(C) Storage in a seed bank
(D) Cryopreservation of gametes

Genetic technology

Q58. In the polymerase chain reaction, what is the purpose of the heating step to around 95 degrees Celsius?

(A) To activate DNA ligase
(B) To anneal primers to the template
(C) To denature DNA into single strands
(D) To synthesise new DNA strands

Q59. During gel electrophoresis, why do smaller DNA fragments move further?

(A) They carry a positive charge
(B) They pass through the gel pores more easily
(C) They are attracted to the negative electrode
(D) They bind more stain than larger fragments

Q60. Which step is essential to produce recombinant DNA using a plasmid vector?

(A) Heating the plasmid to destroy all genes
(B) Copying the plasmid by PCR only
(C) Inserting the gene into a chromosome by meiosis
(D) Cutting plasmid and gene with the same restriction enzyme and joining with ligase

Answer Key

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

Q7: D	Q17: D	Q27: B	Q37: D	Q47: D	Q57: A
Q8: B	Q18: A	Q28: A	Q38: B	Q48: B	Q58: C
Q9: D	Q19: C	Q29: A	Q39: A	Q49: B	Q59: B
Q10: C	Q20: B	Q30: D	Q40: C	Q50: D	Q60: D

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-1/