A-Level Biology Practice Test 11

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 ribosomes is correct?

(A) Eukaryotic ribosomes are 70S and are found only in mitochondria
(B) Prokaryotic ribosomes are 80S and are larger than eukaryotic ribosomes
(C) Prokaryotic ribosomes are 70S and are smaller than eukaryotic 80S ribosomes
(D) Ribosomes in the rough endoplasmic reticulum are 70S in all eukaryotes

Q2. Which sequence correctly describes the route of a secreted protein through a cell?

(A) Rough endoplasmic reticulum, vesicle, Golgi apparatus, vesicle, cell surface membrane
(B) Golgi apparatus, rough endoplasmic reticulum, vesicle, cell surface membrane
(C) Smooth endoplasmic reticulum, Golgi apparatus, rough endoplasmic reticulum, cell surface membrane
(D) Rough endoplasmic reticulum, Golgi apparatus, nucleus, vesicle, cell surface membrane

Q3. In an electron micrograph, a mitochondrion is 40 mm long. Its actual length is 4 micrometres. What is the magnification of the micrograph?

(A) x10
(B) x100
(C) x1000
(D) x10000

Biological molecules

Q4. Which property of water depends directly on hydrogen bonding between its molecules?

(A) Its high specific heat capacity, which buffers temperature change
(B) Its low boiling point compared with other liquids
(C) Its inability to dissolve ionic substances
(D) Its low surface tension at an air-water interface

Q5. A triglyceride is formed from glycerol and three fatty acids. Which statement about this reaction is correct?

(A) Three water molecules are released as three ester bonds form
(B) Three water molecules are used up as three peptide bonds form
(C) One water molecule is released as one glycosidic bond forms
(D) No water is involved because the reaction is a hydrolysis

Q6. Which feature gives collagen its high tensile strength?

(A) A triple helix of polypeptides held together by hydrogen bonds, with glycine at every third position
(B) A single alpha-helix stabilised by disulfide bridges between every residue
(C) Branched chains of glucose joined by 1,6 glycosidic bonds
(D) A globular shape with a hydrophobic core that dissolves in water

Enzymes

Q7. Which statement best describes the induced fit model of enzyme action?

(A) The enzyme changes shape slightly as the substrate binds, improving the fit and stressing bonds in the substrate
(B) The active site is rigid and only a substrate of exactly the right shape can enter it
(C) The substrate changes the shape of the whole enzyme permanently
(D) The active site and substrate both remain unchanged throughout the reaction

Q8. A competitive inhibitor is added to an enzyme-catalysed reaction. What effect does it have on the kinetic constants?

(A) Vmax stays the same and Km increases
(B) Vmax decreases and Km stays the same
(C) Both Vmax and Km decrease
(D) Both Vmax and Km increase

Q9. Why does an extreme change in pH reduce the rate of an enzyme-catalysed reaction?

(A) It changes the charges on amino acid side chains, disrupting bonds that hold the tertiary structure and active site shape
(B) It breaks the peptide bonds of the substrate
(C) It increases the kinetic energy of the enzyme until it evaporates
(D) It converts the enzyme into a competitive inhibitor

Cell membranes and transport

Q10. Which statement about the fluid mosaic model is correct?

(A) Phospholipids form a bilayer in which proteins float, and cholesterol helps regulate fluidity
(B) The membrane is a rigid double layer of protein with phospholipids embedded in it
(C) Glycolipids form the main structural layer and phospholipids act only as receptors
(D) The bilayer is made of cholesterol molecules with proteins on the outside only

Q11. Which process requires ATP directly?

(A) Facilitated diffusion of glucose down its concentration gradient
(B) Osmosis of water through aquaporins
(C) Active transport of ions against their concentration gradient
(D) Simple diffusion of oxygen across a membrane

Q12. In the sodium-potassium pump, what happens in each cycle?

(A) Three sodium ions are pumped out and two potassium ions are pumped in, using one ATP

(B) Two sodium ions are pumped out and three potassium ions are pumped in

(C) Three potassium ions are pumped out and two sodium ions are pumped in, using one ATP

(D) Equal numbers of sodium and potassium ions move in the same direction

The mitotic cell cycle

Q13. During which phase of the cell cycle does DNA replication occur, and what is its immediate result?

(A) S phase of interphase, when each chromosome consists of two identical sister chromatids

(B) Prophase, when chromosomes condense

(C) G1 phase, when the cell grows and organelles are made

(D) Cytokinesis, when the cytoplasm divides

Q14. Which event occurs during anaphase of mitosis?

(A) Sister chromatids are pulled apart to opposite poles as centromeres divide

(B) Chromosomes line up on the equator of the spindle

(C) Nuclear envelopes reform around two sets of chromosomes

(D) Homologous chromosomes pair up and exchange segments

Q15. Why is mitosis important in the growth of a multicellular organism?

(A) It produces genetically varied gametes for sexual reproduction

(B) It halves the chromosome number in body cells

(C) It produces genetically identical cells, preserving the chromosome number as tissues grow

(D) It replaces damaged cells with cells containing new combinations of alleles

Nucleic acids and protein synthesis

Q16. The Meselson and Stahl experiment supported semi-conservative replication. What result was observed after one generation in nitrogen-14?

(A) All DNA was heavy, containing only nitrogen-15

(B) Half the DNA was heavy and half was light, with no intermediate band

(C) All DNA was of intermediate density, with one old and one new strand

(D) All DNA was light, containing only nitrogen-14

Q17. During transcription, which statement is correct?

(A) DNA polymerase copies both strands of DNA into mRNA

(B) Ribosomes join amino acids directly to the DNA template

(C) RNA polymerase binds to a promoter and copies the template strand into pre-mRNA

(D) The coding strand is copied and introns are translated

Q18. Which feature of the genetic code is shown when two different codons specify the same amino acid?

(A) The code is universal
(B) The code is non-overlapping
(C) The code is degenerate
(D) The code is punctuated by start codons only

Transport in plants

Q19. Which statement best explains the cohesion-tension theory of water movement in xylem?

(A) Root pressure pushes water up, and adhesion alone holds the column together
(B) Active transport in leaves pumps water down the xylem by osmosis
(C) Transpiration from leaves creates tension that pulls a continuous column of water up, held together by cohesion between water molecules
(D) Capillary action in root hairs is the only force moving water to the leaves

Q20. Which structural feature allows a xylem vessel to withstand the tension of transpiration pull without collapsing?

(A) A living cytoplasm that actively pumps water upward
(B) Sieve plates that distribute pressure evenly
(C) Thick lignified walls surrounding a hollow, dead lumen
(D) Chloroplasts that supply ATP for water uptake

Q21. In translocation, how is sucrose loaded into sieve tubes at a source?

(A) Sucrose diffuses passively from mesophyll cells into the xylem
(B) Sieve tubes actively pump water into the phloem by osmosis alone
(C) Companion cells use ATP to pump hydrogen ions out, and sucrose enters with hydrogen ions by cotransport before moving into sieve tubes
(D) Sucrose is carried upward in the transpiration stream

Transport in mammals

Q22. Which statement about the mammalian double circulation is correct?

(A) Blood passes through the heart once per complete circuit
(B) Oxygenated and deoxygenated blood mix freely in the left ventricle
(C) The pulmonary circulation carries blood to the lungs and the systemic circulation carries blood to the rest of the body
(D) The right ventricle pumps blood to the whole body at high pressure

Q23. The Bohr shift describes how haemoglobin affinity for oxygen changes in respiring tissues. What causes it?

(A) A rise in pH from carbon dioxide removal, which increases affinity
(B) A rise in temperature that increases the oxygen content of blood
(C) A fall in pH as carbon dioxide forms carbonic acid, which reduces affinity and releases oxygen
(D) A fall in carbon dioxide concentration that makes haemoglobin bind oxygen more tightly

Q24. At the venule end of a capillary, why does most tissue fluid re-enter the capillary rather than remain in the tissues?

(A) Lymph vessels actively pump fluid back into the blood
(B) Hydrostatic pressure rises sharply at the venule end
(C) The inward pull of plasma proteins exceeds the lower hydrostatic pressure, drawing water back by osmosis
(D) Capillary walls become impermeable to water at the venule end

Gas exchange

Q25. Which adaptation of alveoli most directly increases the rate of gas exchange by diffusion?

(A) Their thick muscular walls that contract during breathing
(B) Their connection to the trachea by cartilage rings
(C) Their production of mucus that traps dust particles
(D) Their large total surface area combined with walls one cell thick

Q26. Why is countercurrent flow in fish gills more efficient than parallel flow?

(A) It allows blood and water to reach the same oxygen concentration at the start of the lamella
(B) It pumps oxygen actively into the blood against its gradient
(C) It stops water from flowing over the gills altogether
(D) It maintains a concentration gradient along the whole length of the lamella, so oxygen diffuses in continuously

Q27. In insects, how does oxygen reach respiring muscle cells?

(A) It is carried in the blood to the cells by haemoglobin
(B) It is pumped through the gut by peristalsis
(C) It dissolves in tissue fluid after crossing a lung surface
(D) It diffuses through spiracles and tracheae directly to tracheoles close to the cells

Infectious diseases

Q28. HIV is classified as a retrovirus. What does this mean for its replication?

(A) It carries DNA that is copied directly by host ribosomes
(B) It forms spores that survive in the environment for years
(C) It reproduces by binary fission outside host cells
(D) It carries RNA that is converted to DNA by reverse transcriptase and inserted into the host genome

Q29. How does the cholera toxin cause the main symptom of cholera?

(A) It destroys red blood cells, causing anaemia
(B) It prevents absorption of glucose in the small intestine only
(C) It blocks nerve impulses to the gut wall, preventing peristalsis
(D) It causes chloride ions and water to be secreted into the gut lumen, producing severe watery diarrhoea

Q30. A patient with tuberculosis is advised to complete a six-month course of antibiotics even after symptoms improve. Why is completing the course important?

(A) It kills a virus spread through contaminated water
(B) It prevents spread by mosquitoes
(C) It kills a fungus that grows only on the skin
(D) It kills slow-growing Mycobacterium tuberculosis, including persistent bacteria, so resistant survivors are less likely to remain

Immunity

Q31. Which sequence correctly describes phagocytosis of a bacterium?

(A) Antibodies are produced, then the bacterium is engulfed by a lymphocyte
(B) Memory cells divide and release histamine to kill the bacterium
(C) The bacterium is coated with complement, then destroyed by plasma cells
(D) The phagocyte recognises the bacterium, engulfs it into a phagosome, lysosomes fuse with it, and enzymes digest it

Q32. Which statement distinguishes the cell-mediated response from the humoral response?

(A) The humoral response uses T killer cells to destroy infected body cells, while the cell-mediated response uses antibodies
(B) The humoral response acts only against fungi, while the cell-mediated response acts only against bacteria
(C) Both responses are carried out only by phagocytes
(D) The cell-mediated response involves T lymphocytes destroying infected cells, while the humoral response involves B lymphocytes producing antibodies

Q33. Why is the secondary immune response faster and stronger than the primary response?

(A) The pathogen is weaker on second exposure
(B) The skin becomes impermeable after the first infection
(C) Phagocytes permanently retain antibodies from the first infection
(D) Memory B and T cells from the first exposure divide rapidly and produce a larger, faster antibody response

Energy and respiration

Q34. Which statement about ATP is correct?

(A) ATP is a long-term energy store made only in photosynthesis
(B) ATP stores energy in its ribose sugar, which is broken down in respiration
(C) ATP is synthesised by breaking down ADP with energy from light only
(D) Hydrolysis of ATP to ADP and inorganic phosphate releases energy that can drive endergonic reactions

Q35. In the link reaction, pyruvate is converted to acetyl coenzyme A. What else happens?

(A) Carbon dioxide is released and NAD is reduced to NADH
(B) Oxygen is used up and water is formed
(C) Glucose is regenerated and ATP is hydrolysed
(D) Acetyl coenzyme A is oxidised directly to carbon dioxide and water

Q36. Which statement best describes chemiosmosis in oxidative phosphorylation?

(A) Electrons pass directly from NADH to ATP synthase, forming ATP

(B) Hydrogen ions are pumped into the mitochondrial matrix, then diffuse out through ATP synthase

(C) Hydrogen ions accumulate in the intermembrane space, and their flow back through ATP synthase drives ATP synthesis

(D) Oxygen accepts electrons in the matrix and pumps protons across the outer membrane

Q37. A yeast culture respires anaerobically. Which products and net ATP yield per glucose molecule are expected?

(A) Lactic acid only, with a net yield of 2 ATP

(B) Ethanol and water, with a net yield of 36 ATP

(C) Carbon dioxide and water, with a net yield of 38 ATP

(D) Ethanol and carbon dioxide, with a net yield of 2 ATP

Photosynthesis

Q38. What is produced directly by photolysis of water in the light-dependent stage?

(A) Glucose, oxygen and ATP

(B) Glycerate 3-phosphate and RuBP

(C) Carbon dioxide, reduced NADP and ADP

(D) Oxygen, protons and electrons

Q39. In the Calvin cycle, carbon dioxide combines with RuBP. What happens next in the cycle?

(A) The six-carbon product splits into two molecules of glycerate 3-phosphate, which are reduced to triose phosphate using ATP and reduced NADP

(B) The product is oxidised directly to glucose without any ATP input

(C) RuBP is converted to oxygen and water

(D) Glycerate 3-phosphate is used to make chlorophyll

Q40. At low light intensity, increasing the carbon dioxide concentration has little effect on the rate of photosynthesis. Why?

(A) Carbon dioxide is toxic at low light intensity

(B) Chlorophyll is destroyed when carbon dioxide rises

(C) The stomata close completely in dim light, preventing all gas exchange

(D) Light intensity is the limiting factor, so the light-dependent stage cannot supply enough ATP and reduced NADP

Q41. Why do leaves appear green?

(A) Chlorophyll absorbs green light most strongly and reflects red light

(B) The leaf epidermis filters out red and blue light

(C) Carotenoids reflect all wavelengths except green

(D) Chlorophyll absorbs mainly red and blue light and reflects green light

Homeostasis

Q42. Which statement describes negative feedback in the control of water potential of the blood?

(A) A rise in water potential stimulates ADH release, which increases water reabsorption until water potential falls

(B) A fall in water potential is detected by osmoreceptors, ADH release increases, water reabsorption rises, and water potential returns towards normal

(C) ADH release always increases, regardless of blood water potential

(D) A fall in water potential inhibits ADH, causing more water to be lost in urine

Q43. During ultrafiltration in the glomerulus, which substances are prevented from entering the Bowman's capsule?

(A) Glucose, amino acids and salts

(B) Urea and water

(C) Blood cells and most plasma proteins

(D) Small ions and vitamins

Q44. After a meal, blood glucose concentration rises. Which hormonal sequence restores it?

(A) Glucagon stimulates glycogenolysis in the liver, raising blood glucose further

(B) Insulin stimulates uptake of glucose by cells and conversion of glucose to glycogen in the liver and muscles

(C) Adrenaline inhibits insulin release and blocks glucose uptake

(D) Insulin stimulates breakdown of glycogen to glucose in the liver

Q45. On a cold day, a mammal's skin feels pale and its core temperature stays stable. Which mechanism best explains the pale skin?

(A) Vasodilation of arterioles supplying skin capillaries

(B) Vasoconstriction of arterioles supplying skin capillaries, reducing warm blood flow near the surface

(C) Sweating to increase evaporative heat loss

(D) Relaxation of erector pili muscles so hairs lie flat

Control and coordination

Q46. What maintains the resting potential of a neurone at about -70 mV?

(A) Sodium ions diffuse freely into the axon while potassium ions are pumped out

(B) The sodium-potassium pump exports sodium and imports potassium, and potassium leaks out through channels, leaving the inside negative

(C) Chloride ions are actively pumped into the axon by ATP synthase

(D) The myelin sheath blocks all ion movement across the membrane

Q47. Which sequence describes transmission across a cholinergic synapse?

(A) Action potential arrives, calcium ions enter, vesicles release acetylcholine, acetylcholine binds receptors on the postsynaptic membrane

(B) Acetylcholine is released first, then calcium ions enter the presynaptic neurone

(C) The action potential jumps directly across the synaptic cleft

(D) Vesicles fuse with the postsynaptic membrane and release sodium ions

Q48. Which sequence correctly lists the components of a simple reflex arc?

(A) Effector, motor neurone, relay neurone, sensory neurone, receptor
(B) Receptor, sensory neurone, relay neurone, motor neurone, effector
(C) Receptor, motor neurone, sensory neurone, relay neurone, effector
(D) Sensory neurone, receptor, motor neurone, effector, relay neurone

Inheritance

Q49. In a dihybrid cross between two individuals heterozygous for two unlinked genes, what phenotypic ratio is expected in the offspring?

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

Q50. Haemophilia is caused by a recessive allele on the X chromosome. Why are males more likely than females to show the condition?

(A) Males have two X chromosomes, so they always inherit the allele twice
(B) Males have only one X chromosome, so a single recessive allele is expressed
(C) The allele is dominant in males and recessive in females
(D) Females cannot inherit the allele from their fathers

Q51. A person with blood group AB has both A and B antigens on their red blood cells. What type of inheritance does this illustrate?

(A) Complete dominance
(B) Codominance
(C) Incomplete dominance
(D) Polygenic inheritance

Selection and evolution

Q52. Which sequence best summarises natural selection?

(A) Mutation creates variation, individuals better adapted to the environment survive and reproduce more, and allele frequencies in the population change
(B) The environment directly changes the genes of individuals during their lifetimes, and these changes are inherited
(C) All individuals reproduce equally, but the strongest survive longest
(D) Selection acts on genotypes directly, without any effect on phenotypes

Q53. A bacterial population is exposed to an antibiotic. Resistant bacteria become common. Which explanation is correct?

(A) The antibiotic caused mutations for resistance in the bacteria it touched
(B) Resistant variants were already present, and the antibiotic selected for them by killing susceptible bacteria
(C) All bacteria acquired resistance by learning to avoid the antibiotic
(D) The antibiotic changed the bacterial species into a new genus

Q54. Which condition is essential for allopatric speciation to occur?

(A) Two populations must live in the same area and interbreed freely
(B) A geographical barrier must separate populations so gene flow stops and they diverge
(C) Individuals must acquire identical mutations at the same time
(D) The populations must have identical selection pressures

Classification, biodiversity and conservation

Q55. In the three-domain system, which domains contain prokaryotic organisms?

(A) Eukarya and Archaea
(B) Bacteria and Archaea
(C) Bacteria and Eukarya
(D) Archaea only

Q56. A community has a high Simpson's index of diversity, D. What does this indicate?

(A) One species dominates the community and species richness is low
(B) The community has many species with fairly even abundances
(C) The community contains only a few individuals in total
(D) The community has high genetic diversity within a single species only

Q57. Which of these is an example of in situ conservation?

(A) Storing seeds of a rare plant in a seed bank away from its habitat
(B) Protecting a coral reef in a marine reserve where it naturally occurs
(C) Breeding an endangered animal in a zoo
(D) Growing a rare plant in a botanical garden

Genetic technology

Q58. Which sequence correctly describes one cycle of the polymerase chain reaction?

(A) Extension, annealing, denaturation
(B) Denaturation at high temperature, annealing of primers, extension by Taq polymerase
(C) Annealing, ligation, translation
(D) Denaturation, transcription, gel electrophoresis

Q59. In gel electrophoresis of DNA fragments, why do smaller fragments travel further than larger ones?

(A) DNA is positively charged and moves towards the negative electrode
(B) DNA is negatively charged and moves towards the positive electrode, with smaller fragments passing through the gel pores more easily
(C) Larger fragments are attracted to the wells and do not move
(D) The gel actively pumps small fragments forward

Q60. To make recombinant DNA, a gene is inserted into a plasmid. Which enzymes are needed?

(A) DNA polymerase to cut the plasmid and ligase to copy the gene
(B) A restriction enzyme to cut both DNA molecules and DNA ligase to join them
(C) Reverse transcriptase to cut the plasmid and Taq polymerase to seal it
(D) Helicase to join the fragments and protease to remove introns

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-11/