A-Level Biology Practice Test 12

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 organelle is the site of most ATP synthesis in a eukaryotic cell, and why is it suited to this role?

(A) The Golgi apparatus, because it has a large surface area of flattened sacs
(B) The nucleus, because it contains the genes for respiration enzymes
(C) The mitochondrion, because its folded inner membrane carries the electron transport chain and ATP synthase
(D) The lysosome, because its enzymes release energy from food molecules

Q2. A student compares a prokaryotic cell with a eukaryotic cell. Which feature is found in the prokaryotic cell but not in a typical eukaryotic cell?

(A) A nucleus enclosed by a double membrane
(B) Membrane-bound mitochondria
(C) Circular DNA free in the cytoplasm, without a nucleus
(D) A Golgi apparatus for modifying proteins

Q3. Which function is carried out by the smooth endoplasmic reticulum?

(A) Synthesis and transport of proteins for secretion
(B) Production of ribosomal RNA
(C) Lipid synthesis and detoxification of some substances
(D) Digestion of worn-out organelles

Biological molecules

Q4. Which statement about the structure of starch is correct?

(A) It is made of beta-glucose units joined by 1,4 and 1,6 glycosidic bonds
(B) It is a polymer of fructose joined by peptide bonds
(C) It is made of alpha-glucose units, with amylose unbranched and amylopectin branched
(D) It is a single long chain of glucose with no branching at all

Q5. Why is cellulose strong despite being made only of glucose?

(A) Cellulose chains are coiled into alpha-helices that resist stretching
(B) Glucose units are joined by ester bonds into a triple helix
(C) Beta-glucose units form straight chains linked by hydrogen bonds into microfibrils
(D) Each glucose unit is bonded to a protein that stiffens the wall

Q6. A protein has a quaternary structure. What does this mean?

(A) It consists of a single polypeptide folded into an alpha-helix
(B) It is made of four amino acids only
(C) It consists of two or more polypeptide chains held together in a specific arrangement
(D) Its sequence is determined by four different genes

Enzymes

Q7. In an enzyme experiment, the substrate concentration is increased until the rate no longer rises. What limits the rate at this point?

(A) The number of substrate molecules in solution
(B) The temperature of the reaction mixture
(C) The number of active sites available, because the enzyme is saturated
(D) The concentration of the product, which acts as a substrate

Q8. A non-competitive inhibitor is added to a reaction. Which statement is correct?

(A) It binds to the active site and can be outcompeted by adding more substrate
(B) It increases both Vmax and Km
(C) It binds elsewhere on the enzyme, changes the active site shape, and lowers Vmax
(D) It is broken down by the enzyme into a useful product

Q9. Which graph feature shows that an enzyme has a high affinity for its substrate?

(A) A high Vmax
(B) A steep fall in rate as temperature rises
(C) A low Km, meaning half-maximum rate is reached at a low substrate concentration
(D) A high optimum pH

Cell membranes and transport

Q10. Which molecule crosses a cell surface membrane by simple diffusion most readily?

(A) A large polar protein
(B) A charged sodium ion
(C) A small non-polar molecule such as oxygen
(D) A glucose molecule

Q11. A red blood cell is placed in a solution with a lower water potential than the cell. What happens, and why?

(A) The cell swells and bursts because water enters by osmosis
(B) The cell takes up solutes by active transport until it bursts
(C) The cell stays the same size because osmosis only occurs in plant cells
(D) The cell shrinks and crenates because water leaves by osmosis

Q12. In the ileum, glucose is absorbed against its concentration gradient by cotransport with sodium ions. What provides the energy for this indirectly?

(A) ATP used by the sodium-potassium pump to maintain a sodium gradient
(B) ATP used directly by glucose carrier proteins
(C) Diffusion of glucose down its gradient in the blood
(D) Hydrolysis of glucose in the gut lumen

The mitotic cell cycle

Q13. Which statement about checkpoints in the cell cycle is correct?

(A) Checkpoints prevent the cell from ever dividing more than once
(B) Checkpoints double the chromosome number before every division
(C) Checkpoints occur only after cytokinesis has finished
(D) Checkpoints halt the cycle if DNA is damaged or chromosomes are not properly attached, allowing repair or preventing faulty division

Q14. A cell with 2n = 6 undergoes mitosis. How many chromosomes and chromatids are present in a daughter cell immediately after telophase?

(A) 6 chromosomes, each with one chromatid
(B) 3 chromosomes, each with two chromatids
(C) 12 chromosomes, each with one chromatid
(D) 6 chromosomes, each with two chromatids

Q15. Which stage of mitosis is characterised by chromosomes becoming visible as they condense and the nuclear envelope breaking down?

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

Nucleic acids and protein synthesis

Q16. Which statement correctly compares DNA and RNA?

(A) DNA contains uracil and ribose, while RNA contains thymine and deoxyribose
(B) DNA is single-stranded and RNA is double-stranded in all cells
(C) Both are double-stranded and contain thymine
(D) DNA is usually double-stranded with deoxyribose and thymine, while RNA is usually single-stranded with ribose and uracil

Q17. At a ribosome, what is the role of tRNA during translation?

(A) It carries a specific amino acid to the ribosome and its anticodon pairs with an mRNA codon
(B) It copies DNA into mRNA in the nucleus
(C) It forms peptide bonds between ribosomal subunits
(D) It removes introns from pre-mRNA

Q18. A point mutation changes a codon from UAU to UAA. What is the most likely effect on the protein?

(A) No effect, because the code is degenerate
(B) One amino acid is replaced by another with similar properties
(C) Translation stops early, producing a shortened, usually non-functional protein
(D) The whole reading frame shifts by one base

Transport in plants

Q19. Which factor would increase the rate of transpiration from a leaf?

(A) High humidity and still air
(B) Low temperature and darkness
(C) Wind and low humidity, which maintain a steep water vapour gradient
(D) Closing the stomata

Q20. What is the role of the Casparian strip in a root?

(A) It pumps water into the xylem by active transport
(B) It allows water to bypass the endodermis completely
(C) It stores starch in the cortex for later use
(D) It blocks the apoplast pathway in the endodermis, forcing water and ions through cell membranes into the symplast

Q21. Which statement about phloem sieve tubes is correct?

(A) Sieve tube elements are dead cells with thick lignified walls
(B) Sieve tubes are found only in the roots of flowering plants
(C) Sieve tubes transport water and mineral ions from roots to leaves
(D) Sieve tube elements are living cells with little cytoplasm and no nucleus, supported by companion cells

Transport in mammals

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

(A) The left ventricle pumps blood to the lungs at low pressure
(B) The left ventricle has four valves instead of two
(C) The right ventricle receives blood from the vena cava and needs more muscle
(D) The left ventricle must generate enough pressure to pump blood around the whole body

Q23. Fetal haemoglobin has a higher affinity for oxygen than adult haemoglobin. What is the advantage?

(A) It releases oxygen more easily in the fetal tissues
(B) It prevents the Bohr shift from occurring in the fetus
(C) It carries carbon dioxide more efficiently to the mother
(D) It takes up oxygen from the maternal blood across the placenta, even at low oxygen partial pressures

Q24. At the venule end of a capillary, most tissue fluid returns to the blood. Why?

(A) Hydrostatic pressure is now low, so the solute potential gradient draws fluid back in
(B) Lymph vessels pump fluid back into the capillary
(C) Active transport moves water back into the blood
(D) The capillary wall becomes impermeable to water at this end

Gas exchange

Q25. During inspiration in a mammal, what happens to the diaphragm and the external intercostal muscles?

(A) The diaphragm relaxes and rises, and the external intercostal muscles relax
(B) Both sets of muscles relax, allowing air to flow in passively
(C) The diaphragm contracts and the internal intercostal muscles contract
(D) The diaphragm contracts and flattens, and the external intercostal muscles contract, raising the ribs

Q26. Which feature of the mammalian gas exchange surface maintains a steep diffusion gradient?

(A) The thick layer of mucus lining the alveoli
(B) The large volume of air left in the lungs after exhalation
(C) The cartilage rings in the trachea
(D) The rich capillary network that constantly removes oxygenated blood and brings deoxygenated blood

Q27. A fish is in water with a low oxygen concentration. Which response would help maintain oxygen uptake?

(A) Reducing ventilation rate to save energy
(B) Switching to anaerobic respiration in the gills
(C) Closing the operculum permanently
(D) Increasing ventilation rate so more water flows over the gills

Infectious diseases

Q28. Which statement about the transmission of malaria is correct?

(A) It is spread directly from person to person by coughing
(B) It is spread by eating undercooked meat
(C) It is spread through contaminated drinking water
(D) It is spread by the bite of an infected female Anopheles mosquito carrying Plasmodium in its salivary glands

Q29. Why can antibiotics not be used to treat HIV infection?

(A) HIV is a virus, and antibiotics target bacterial structures and processes that viruses lack
(B) HIV is protected by a thick bacterial cell wall
(C) Antibiotics destroy helper T cells before they can act
(D) HIV mutates into a bacterium inside the host

Q30. Which measure is most effective for controlling the spread of cholera in an outbreak?

(A) Vaccinating against the cholera virus
(B) Quarantining all healthy people in the area
(C) Spraying insecticide to kill mosquito vectors
(D) Providing clean drinking water and safe sewage disposal to break faecal-oral transmission

Immunity

Q31. A patient with HIV has a falling helper T cell count and develops infections that healthy people usually resist. Why does loss of helper T cells have such a wide effect?

(A) They produce antibodies directly against free antigens
(B) They form a physical barrier in the skin
(C) They engulf pathogens and digest them in lysosomes
(D) They release cytokines that stimulate B cells and killer T cells, so their loss weakens both arms of the response

Q32. A laboratory test uses an antibody that binds only the beta subunit of human chorionic gonadotrophin. Why is a monoclonal antibody preferred for this test?

(A) It is a mixture of antibodies from many clones, giving a broader signal
(B) It can be produced by phagocytes without any B cells
(C) It binds every protein in the sample, increasing sensitivity
(D) Identical antibodies from a single clone bind one epitope, reducing cross-reaction with similar hormones

Q33. In active immunity, how does the body gain protection?

(A) Antibodies are injected directly and give immediate, short-lived protection
(B) Phagocytes are transferred from a donor
(C) Antibodies pass from mother to baby in breast milk
(D) The immune system responds to an antigen, produces its own antibodies and memory cells, giving longer-lasting protection

Energy and respiration

Q34. Where do glycolysis, the Krebs cycle and oxidative phosphorylation occur in a eukaryotic cell?

(A) Glycolysis in the cytoplasm, Krebs cycle in the mitochondrial matrix, oxidative phosphorylation on the inner mitochondrial membrane
(B) All three in the cytoplasm
(C) Glycolysis in the matrix, Krebs cycle on the cristae, oxidative phosphorylation in the cytoplasm
(D) Glycolysis on the inner membrane, Krebs cycle in the cytoplasm, oxidative phosphorylation in the matrix

Q35. Which statement about the Krebs cycle is correct?

(A) Acetyl coenzyme A combines with oxaloacetate, and carbon dioxide is released as intermediates are oxidised
(B) Glucose is split into two molecules of pyruvate
(C) Oxygen is reduced to water directly in the cycle
(D) The cycle produces glucose from carbon dioxide

Q36. If oxygen is absent, why does the yield of ATP from glucose fall sharply?

(A) Glycolysis stops completely without oxygen
(B) Reduced NAD and FAD cannot be reoxidised by the electron transport chain, so the Krebs cycle and oxidative phosphorylation cannot run
(C) The mitochondria produce ATP directly from oxygen
(D) Glucose cannot enter the cell without oxygen

Photosynthesis

Q37. Which pigments are involved in photosynthesis, and where are they located?

(A) Chlorophyll and carotenoids in the thylakoid membranes of chloroplasts
(B) Haemoglobin and melanin in the stroma
(C) Chlorophyll only, dissolved in the cell sap
(D) Carotenoids only, in the mitochondrial matrix

Q38. In cyclic photophosphorylation, what is produced, and what is not produced?

(A) ATP is produced, but no reduced NADP and no oxygen
(B) Reduced NADP is produced, but no ATP
(C) Oxygen and ATP are produced, but no reduced NADP
(D) Glucose is produced directly

Q39. A leaf is kept in the dark and then illuminated. Which change occurs in the concentrations of glycerate 3-phosphate and triose phosphate?

(A) Glycerate 3-phosphate falls and triose phosphate rises, because the light-dependent stage now supplies ATP and reduced NADP for reduction
(B) Both fall because photosynthesis stops in the light
(C) Glycerate 3-phosphate rises and triose phosphate falls
(D) Neither changes, because the Calvin cycle does not need light

Homeostasis

Q40. Which statement about the control of blood glucose by glucagon is correct?

(A) Glucagon is released when blood glucose is high and stimulates glycogenesis
(B) Glucagon is released when blood glucose is low and stimulates glycogenolysis and gluconeogenesis in the liver
(C) Glucagon is released by beta cells of the islets of Langerhans
(D) Glucagon increases glucose uptake by muscle cells

Q41. In the kidney, where does most selective reabsorption of glucose and amino acids occur?

(A) In the glomerulus by ultrafiltration
(B) In the proximal convoluted tubule by active transport and cotransport
(C) In the loop of Henle by osmosis only
(D) In the collecting duct by ADH action

Q42. A person drinks a large volume of water. Which sequence follows?

(A) Blood water potential falls, osmoreceptors stimulate ADH release, urine becomes concentrated
(B) Blood water potential rises, ADH release falls, collecting duct becomes less permeable, and a large volume of dilute urine is produced
(C) ADH release rises, aquaporins increase, and urine volume falls
(D) Blood water potential rises, ADH release rises, and water reabsorption increases

Control and coordination

Q43. During an action potential, what causes depolarisation of the axon membrane?

(A) Potassium ions diffuse out through voltage-gated channels
(B) Sodium ions diffuse in through voltage-gated channels, making the inside positive
(C) The sodium-potassium pump reverses direction
(D) Chloride ions diffuse in and neutralise the membrane

Q44. Why does saltatory conduction in a myelinated neurone transmit impulses faster than in an unmyelinated neurone?

(A) The impulse travels inside the myelin sheath itself
(B) Action potentials occur only at nodes of Ranvier, so the impulse jumps between nodes
(C) Myelin increases the diameter of the axon to several millimetres
(D) Sodium channels are absent from myelinated neurones

Q45. In phototropism, how does auxin cause a shoot to bend towards light?

(A) Auxin accumulates on the shaded side, promoting cell elongation there, so the shoot bends towards the light
(B) Auxin accumulates on the lit side and inhibits growth there completely
(C) Auxin is destroyed on the shaded side, causing cells there to shrink
(D) Auxin moves to the tip and stops all elongation

Q46. Which statement about the mammalian eye and accommodation for near vision is correct?

(A) The ciliary muscles relax, suspensory ligaments tighten, and the lens becomes thinner
(B) The ciliary muscles contract, suspensory ligaments slacken, and the lens becomes rounder and more convex
(C) The iris contracts to make the pupil larger
(D) The lens moves forward without changing shape

Inheritance

Q47. Two heterozygous parents for a recessive condition have children. What is the probability that a child is a carrier but does not show the condition?

(A) 1 in 4
(B) 1 in 2
(C) 3 in 4
(D) 1 in 8

Q48. What is meant by linkage between two genes?

(A) The genes are on different chromosomes and assort independently
(B) The genes are on the same chromosome and tend to be inherited together, unless crossing over separates them
(C) The genes code for the same protein
(D) The genes are both dominant

Q49. In a test cross, an individual showing the dominant phenotype is crossed with a homozygous recessive individual. What does the result reveal?

(A) Whether the dominant individual is homozygous or heterozygous
(B) The chromosome number of the species
(C) Whether the trait is sex-linked
(D) The mutation rate of the gene

Q50. Which statement about epistasis is correct?

(A) One gene masks the expression of another gene at a different locus
(B) Two alleles of the same gene are both expressed
(C) A single gene affects several different traits
(D) Continuous variation is caused by many genes acting together

Selection and evolution

Q51. Which type of selection favours the intermediate phenotype and reduces variation?

(A) Directional selection
(B) Disruptive selection
(C) Stabilising selection
(D) Artificial selection

Q52. The Hardy-Weinberg principle can be used to estimate allele frequencies. Which condition must hold for a population to remain in Hardy-Weinberg equilibrium?

(A) Strong natural selection must act on the gene
(B) There must be no mutation, migration, selection or genetic drift, and mating must be random
(C) The population must be very small
(D) Only one allele of the gene may exist

Q53. In a population, the frequency of a recessive allele is 0.2. Assuming Hardy-Weinberg equilibrium, what is the expected frequency of heterozygotes?

(A) 0.04
(B) 0.16
(C) 0.32
(D) 0.64

Q54. Which statement about the founder effect is correct?

(A) A small group colonises a new area, carrying only a sample of the original gene pool, so allele frequencies differ from the source population
(B) A large population splits into two equal halves with identical allele frequencies
(C) Mutation rates increase when a population is founded
(D) Founders always carry every allele present in the original population

Classification, biodiversity and conservation

Q55. Which feature is used to classify organisms into the five kingdoms in the traditional system?

(A) Their DNA sequence alone
(B) Cell structure, body organisation and method of nutrition
(C) Their habitat and geographical distribution only
(D) The number of chromosomes they possess

Q56. Why is genetic diversity within a species important for its long-term survival?

(A) It guarantees that every individual is identical and well adapted
(B) It provides variation on which natural selection can act when the environment changes
(C) It prevents any mutation from occurring
(D) It increases the population size directly

Q57. A conservation programme sets up a captive breeding programme and later reintroduces animals to the wild. Which type of conservation is this, and what is a key risk?

(A) In situ conservation, with a risk of habitat loss
(B) Ex situ conservation, with a risk of reduced genetic diversity if few founders are used
(C) In situ conservation, with a risk of inbreeding in captivity
(D) Ex situ conservation, with no risks at all

Genetic technology

Q58. Which statement about gene therapy for a recessive genetic disorder is correct?

(A) A faulty gene is replaced or supplemented with a working copy, often delivered by a modified virus vector
(B) The patient's DNA is removed and replaced with donor DNA
(C) Gene therapy changes the genes of all future generations in every case
(D) Gene therapy works by giving the patient extra chromosomes

Q59. In genetic fingerprinting, why are variable number tandem repeats useful?

(A) They are identical in all individuals
(B) They vary in length between individuals, giving a distinctive pattern of fragments
(C) They code for essential proteins
(D) They are found only in bacteria

Q60. Which social or ethical concern is associated with genetic screening?

(A) Screening always cures the condition it detects
(B) Results could lead to discrimination in employment or insurance, and raise difficult decisions about whether to have children
(C) Screening changes the DNA of the person tested
(D) Screening is only possible after a person has died

Answer Key

Q1: C	Q11: D	Q21: D	Q31: D	Q41: B	Q51: C
Q2: C	Q12: A	Q22: D	Q32: D	Q42: B	Q52: B
Q3: C	Q13: D	Q23: D	Q33: D	Q43: B	Q53: C
Q4: C	Q14: A	Q24: A	Q34: A	Q44: B	Q54: A
Q5: C	Q15: C	Q25: D	Q35: A	Q45: A	Q55: B
Q6: C	Q16: D	Q26: D	Q36: B	Q46: B	Q56: B
Q7: C	Q17: A	Q27: D	Q37: A	Q47: B	Q57: B

Q8: C	Q18: C	Q28: D	Q38: A	Q48: B	Q58: A
Q9: C	Q19: C	Q29: A	Q39: A	Q49: A	Q59: B
Q10: C	Q20: D	Q30: D	Q40: B	Q50: A	Q60: B

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