A-Level Biology Practice Test 9

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 evidence supports the endosymbiotic theory for mitochondria?

(A) Mitochondria are found only in animal cells
(B) Mitochondria have a single membrane
(C) Mitochondria have their own circular DNA and 70S ribosomes
(D) Mitochondria cannot divide independently

Q2. Which organelle detoxifies hydrogen peroxide?

(A) Peroxisome, using catalase
(B) Ribosome
(C) Nucleolus
(D) Vacuole in animal cells only

Q3. A cell is observed to have no membrane-bound organelles, a cell wall of peptidoglycan, and a single circular chromosome. Which additional feature would confirm that it is prokaryotic rather than a small eukaryotic cell?

(A) A nucleus enclosed by a double membrane
(B) Mitochondria for aerobic respiration
(C) Chloroplasts for photosynthesis
(D) Small 70S ribosomes free in the cytoplasm

Biological molecules

Q4. Which bond stabilises the tertiary structure of a protein through interactions between R groups?

(A) Glycosidic bond
(B) Disulfide bridge, ionic bond or hydrophobic interaction
(C) Peptide bond only
(D) Ester bond

Q5. Why does water have a high specific heat capacity?

(A) Water molecules are very small
(B) Water is non-polar
(C) Hydrogen bonds absorb much energy before temperature rises
(D) Water cannot form hydrogen bonds

Q6. Which statement about saturated and unsaturated fatty acids is correct?

(A) Unsaturated fatty acids have double bonds that kink the chain and lower melting point
(B) Saturated fatty acids have many double bonds
(C) Unsaturated fatty acids pack more tightly
(D) Both types are identical in structure

Enzymes

Q7. At low substrate concentration, what is the order of reaction with respect to substrate for most enzymes?

(A) Zero order, because active sites are saturated
(B) Second order always
(C) Negative order
(D) First order, because rate is proportional to substrate concentration

Q8. Why does a small decrease in temperature slow an enzyme reaction without denaturing the enzyme?

(A) Bonds in the active site break permanently
(B) Molecules move more slowly, so collisions are less frequent and less energetic
(C) The substrate is destroyed
(D) The enzyme concentration falls

Q9. Which enzyme is used in biological washing powder, and why?

(A) Amylase only, to remove proteins
(B) Catalase, to bleach fabric
(C) Lipase or protease, to break down stains at lower temperatures
(D) DNA polymerase, to copy stains

Cell membranes and transport

Q10. Which factor increases the rate of facilitated diffusion?

(A) A larger concentration gradient and more channel proteins
(B) A smaller concentration gradient
(C) Fewer carrier proteins
(D) A thicker membrane only

Q11. What happens to a plant cell in a concentrated salt solution?

(A) It becomes turgid
(B) It bursts
(C) It takes up salt by osmosis
(D) It becomes plasmolysed as water leaves by osmosis

Q12. A nerve cell maintains a low internal sodium concentration despite sodium leaking inward. Which feature of the sodium-potassium pump makes this possible?

(A) It moves sodium and potassium both into the cell
(B) It uses ATP to pump sodium out against its concentration gradient, faster than it leaks in
(C) It allows sodium to diffuse passively down its gradient only
(D) It requires no energy input

The mitotic cell cycle

Q13. Which checkpoint ensures chromosomes are correctly attached to the spindle before separation?

(A) The G1 checkpoint
(B) The G2 checkpoint
(C) The metaphase or spindle checkpoint
(D) The cytokinesis checkpoint only

Q14. What is the function of telomeres?

(A) To protect chromosome ends from shortening during replication
(B) To code for spindle proteins
(C) To attach chromosomes to the equator
(D) To trigger cytokinesis

Q15. During which phase do sister chromatids become visible as separate structures under a microscope?

(A) Telophase only
(B) Interphase only
(C) Cytokinesis only
(D) Prophase, as chromosomes condense

Nucleic acids and protein synthesis

Q16. Which molecule binds to the lac repressor protein and prevents it from blocking transcription of the lac operon?

(A) RNA polymerase
(B) Allolactose, a form of lactose
(C) The operator DNA sequence
(D) A ribosome subunit

Q17. How is gene expression controlled in eukaryotes at the transcriptional level?

(A) By ribosomes blocking DNA only
(B) By changing the genetic code itself
(C) By transcription factors binding to promoter and enhancer regions
(D) By deleting all introns permanently

Q18. Which type of RNA carries amino acids, and which carries the code from DNA?

(A) tRNA carries amino acids; mRNA carries the code
(B) mRNA carries amino acids; tRNA carries the code
(C) rRNA carries amino acids; mRNA carries the code
(D) tRNA carries the code; rRNA carries amino acids

Q19. A point mutation creates a premature stop codon. What is the likely effect on the protein?

(A) No effect at all
(B) A longer protein with extra amino acids
(C) The gene is duplicated
(D) A shortened, usually non-functional protein

Transport in plants

Q20. Which evidence supports the mass flow hypothesis for phloem transport?

(A) Phloem sap moves only by diffusion
(B) Phloem sap moves faster than diffusion and from source to sink
(C) Sucrose moves only in xylem
(D) Companion cells have no mitochondria

Q21. What is the Casparian strip, and what does it force water to do?

(A) A band in the epidermis forcing water into xylem directly
(B) A layer in the phloem blocking sucrose
(C) A waterproof band in the endodermis forcing water through cell membranes into the symplast
(D) A waxy layer on leaves only

Q22. Which adaptation of root hairs increases water uptake?

(A) A large surface area and thin walls
(B) A thick cuticle
(C) A small surface area
(D) Lignified walls

Q23. Why does transpiration increase on a sunny day?

(A) Stomata close in light
(B) Roots stop taking up water
(C) The cuticle thickens in sunlight
(D) Stomata open for photosynthesis and leaf temperature rises, increasing evaporation

Transport in mammals

Q24. Which blood vessel has valves, thin walls and a wide lumen?

(A) Artery
(B) Vein
(C) Capillary
(D) Arteriole

Q25. How does the structure of red blood cells suit oxygen transport?

(A) They have a nucleus and large volume
(B) They have mitochondria for respiration
(C) They are biconcave, lack a nucleus and contain haemoglobin
(D) They are large and spherical

Q26. At the venule end of a capillary, why does tissue fluid re-enter the blood?

(A) Water potential of blood is lower due to plasma proteins, so water moves in by osmosis
(B) Hydrostatic pressure exceeds solute potential
(C) Active transport pumps fluid back
(D) Lymph vessels push fluid in

Q27. Which factor shifts the oxygen dissociation curve to the right?

(A) Lower carbon dioxide concentration
(B) Lower temperature only
(C) Higher pH only
(D) Higher temperature and lower pH

Gas exchange

Q28. Why do mammals have a diaphragm and intercostal muscles?

(A) To filter inhaled air
(B) To change thoracic volume and ventilate the lungs
(C) To produce surfactant
(D) To carry blood to alveoli

Q29. In insects, how is gas exchange increased during flight?

(A) Spiracles close permanently
(B) Tracheae fill with blood
(C) Air sacs act as bellows, ventilating the tracheal system
(D) The exoskeleton becomes permeable

Q30. Which feature of the fish gill system prevents blood and water mixing while allowing exchange?

(A) Lamellae are separated by a thin epithelium and capillary walls
(B) Blood flows directly into water
(C) Gills have no blood supply
(D) Water is pumped into the blood

Infectious diseases

Q31. A farmer stops giving antibiotics to healthy animals as a routine growth promoter. How could this practice help slow antibiotic resistance in bacteria affecting humans?

(A) Antibiotics create mutations in bacteria
(B) Resistance only occurs in viruses
(C) All bacteria become resistant after one dose
(D) It reduces selection pressure favouring pre-existing resistant bacteria, so they multiply less readily

Q32. Why can malaria be hard to eliminate even with bed nets?

(A) Bed nets increase mosquito numbers
(B) Mosquitoes develop insecticide resistance and Plasmodium develops drug resistance
(C) Malaria is spread by water alone
(D) Humans cannot develop immunity

Q33. Which pathogen type causes athlete’s foot?

(A) A bacterium
(B) A virus
(C) A fungus
(D) A protoctist

Immunity

Q34. Which immune cells kill virus-infected cells directly?

(A) Cytotoxic T cells
(B) B lymphocytes
(C) Plasma cells
(D) Red blood cells

Q35. What is herd immunity?

(A) Immunity gained only by animals
(B) Immunity that lasts for one day only
(C) Passive immunity from mother to child only
(D) Protection of unvaccinated individuals when most of a population is immune

Q36. Why are monoclonal antibodies useful in diagnosis?

(A) They bind to many different antigens randomly
(B) They bind specifically to one antigen, allowing precise detection
(C) They kill all pathogens on contact
(D) They replace vaccination entirely

Energy and respiration

Q37. How many ATP molecules are produced in total by substrate-level phosphorylation in aerobic respiration of one glucose?

(A) Two
(B) Ten
(C) Four
(D) Thirty-two

Q38. What is the final electron acceptor in aerobic respiration?

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

Q39. A respirometer shows oxygen uptake of 60 cubic millimetres in 10 minutes. What is the rate per minute?

(A) 0.6 cubic millimetres per minute
(B) 60 cubic millimetres per minute
(C) 600 cubic millimetres per minute
(D) 6 cubic millimetres per minute

Photosynthesis

Q40. Which reaction in the light-dependent stage produces ATP by chemiosmosis?

(A) Photolysis alone
(B) Proton accumulation in the thylakoid lumen driving ATP synthase
(C) Carbon fixation
(D) Reduction of glycerate 3-phosphate

Q41. Why do plants appear green in white light?

(A) Chlorophyll absorbs green light most strongly
(B) Leaves contain no other pigments
(C) Chlorophyll reflects and transmits green light while absorbing blue and red
(D) Green light is used fastest in photosynthesis

Q42. If carbon dioxide concentration is limiting, which stage is directly affected first?

(A) Carbon fixation by Rubisco in the Calvin cycle
(B) Photolysis of water
(C) Electron transport in photosystem II
(D) Chlorophyll excitation only

Homeostasis

Q43. Where are osmoreceptors located?

(A) In the kidney cortex
(B) In the adrenal cortex
(C) In the collecting duct
(D) In the hypothalamus of the brain

Q44. Which cells in the pancreas secrete insulin?

(A) Alpha cells of the islets of Langerhans
(B) Beta cells of the islets of Langerhans
(C) Acinar cells
(D) Hepatocytes

Q45. What is the role of the liver in glucose homeostasis?

(A) It produces insulin
(B) It excretes excess glucose in bile
(C) It stores glucose as glycogen and releases glucose by glycogenolysis and gluconeogenesis
(D) It converts glucose to ADH

Control and coordination

Q46. What is temporal summation at a synapse?

(A) Repeated impulses from one presynaptic neurone building up transmitter release
(B) Several presynaptic neurones firing together
(C) Inhibitory signals cancelling all excitation
(D) Action potentials travelling in both directions

Q47. Which reflex arc component carries impulses to the effector?

(A) Sensory neurone
(B) Relay neurone
(C) Receptor
(D) Motor neurone

Q48. In the eye, which structure changes shape to focus on near objects?

(A) Cornea only
(B) Lens, made more convex by ciliary muscles
(C) Retina
(D) Iris alone

Inheritance

Q49. Which statement about codominance and incomplete dominance is correct?

(A) Both patterns give a 3:1 phenotypic ratio
(B) Codominance only occurs in blood groups
(C) In codominance both alleles are fully expressed; in incomplete dominance the heterozygote is intermediate
(D) Incomplete dominance means one allele is dominant

Q50. A chi-squared test gives a value below the critical value. What conclusion is drawn?

(A) There is no significant difference; the null hypothesis is accepted
(B) The observed results differ significantly from expected
(C) The experiment must be repeated with no controls
(D) The gene must be sex-linked

Q51. Why can a recessive allele remain in a population at low frequency?

(A) It is expressed in heterozygotes
(B) It is always lethal
(C) It mutates back each generation
(D) It is hidden in heterozygotes and only expressed when homozygous

Selection and evolution

Q52. Which statement defines a species under the biological species concept?

(A) A group that looks identical
(B) A group that can interbreed to produce fertile offspring
(C) A group living in the same habitat only
(D) A group with identical DNA

Q53. Which type of variation is usually continuous?

(A) Blood group, controlled by one gene
(B) Ability to roll the tongue only
(C) Height, controlled by many genes and environment
(D) Presence of a single mutation only

Q54. How does gene flow affect allele frequencies?

(A) It can introduce new alleles or change frequencies through migration
(B) It always increases variation within a population
(C) It prevents all mutation
(D) It only occurs by mutation

Classification, biodiversity and conservation

Q55. Which domain includes bacteria without a membrane-bound nucleus?

(A) Eukarya
(B) Archaea only for all prokaryotes
(C) Plantae
(D) Bacteria

Q56. Why are some species classified as endangered?

(A) They are found in zoos only
(B) Their population is very small or falling rapidly, with high extinction risk
(C) They have large populations everywhere
(D) They are newly discovered

Q57. Which human activity most directly causes habitat fragmentation?

(A) Establishing a nature reserve
(B) Captive breeding
(C) Building roads and clearing land for agriculture
(D) Releasing rehabilitated animals

Genetic technology

Q58. A patient with cystic fibrosis is treated by delivering a working copy of the CFTR gene to lung cells using a modified virus. Which term describes this approach?

(A) Gene therapy
(B) Cloning a whole patient
(C) Screening embryos only
(D) Producing antibodies in bacteria

Q59. Why is reverse transcriptase useful in genetic engineering?

(A) It cuts DNA at specific sites
(B) It separates DNA fragments by size
(C) It synthesises RNA primers
(D) It copies mRNA into complementary DNA without introns

Q60. Which ethical concern is raised by genetic screening?

(A) Screening always cures genetic disease
(B) Results may affect insurance, employment or family decisions
(C) Screening changes the genetic code itself
(D) Screening works only for infectious disease

Answer Key

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

Q10: A	Q20: B	Q30: A	Q40: B	Q50: A	Q60: B

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-9/