A-Level Biology Practice Test 20

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 would be most abundant in a cell that secretes large amounts of digestive enzymes?

(A) Rough endoplasmic reticulum and Golgi apparatus, for synthesis and packaging of secretory proteins
(B) Chloroplasts, for capturing light energy
(C) Large vacuoles, for storing water
(D) Lysosomes only, for digesting the enzymes

Q2. A prokaryotic cell and a eukaryotic cell are both placed in distilled water. Which statement about their responses is correct?

(A) Both will burst because neither has a cell wall
(B) Both resist bursting because their cell walls prevent excessive water uptake, although animal eukaryotic cells without walls would burst
(C) Only the prokaryotic cell has a wall and survives
(D) Neither cell is affected by osmosis

Q3. Which feature distinguishes smooth endoplasmic reticulum from rough endoplasmic reticulum?

(A) It is studded with ribosomes
(B) It is found only in plant cells
(C) It lacks ribosomes and is involved in lipid synthesis and detoxification
(D) It contains DNA

Q4. Magnification and resolution are often confused. Which statement correctly distinguishes them?

(A) Magnification is how much larger an image appears, while resolution is the ability to distinguish two close points as separate
(B) Resolution is how much larger an image appears, while magnification is the clarity of staining
(C) Both terms mean the same thing in microscopy
(D) Magnification depends only on the specimen, while resolution depends only on the observer

Biological molecules

Q5. Sucrose is a disaccharide formed from glucose and fructose. Which bond joins them, and what is released in its formation?

(A) Peptide bond, with carbon dioxide released
(B) Glycosidic bond, with water released in a condensation reaction
(C) Ester bond, with oxygen released
(D) Hydrogen bond, with ATP released

Q6. Why do lipids provide more energy per gram than carbohydrates when oxidised?

(A) Lipids contain more water per gram
(B) Lipids contain nitrogen that releases energy
(C) Lipids contain proportionally more hydrogen and less oxygen, so more oxidation occurs per gram
(D) Lipids are soluble in water and respire faster

Q7. Which property of water results from hydrogen bonding between its molecules?

(A) It is a non-polar solvent
(B) It is insoluble for ionic compounds
(C) It has a low boiling point for its molecular size
(D) It has high surface tension and cohesion, allowing water columns to be pulled up plants

Q8. A sample gives a positive emulsion test but a negative Benedict test. What can be concluded?

(A) The sample contains reducing sugar but no lipid
(B) The sample contains starch but no lipid
(C) The sample contains protein but no lipid
(D) The sample contains lipid but no reducing sugar

Enzymes

Q9. A competitive inhibitor and a non-competitive inhibitor are compared at very high substrate concentration. What is expected?

(A) Both inhibitors completely prevent any reaction
(B) Neither inhibitor has any effect at high substrate concentration
(C) The competitive inhibitor effect is overcome, but the non-competitive inhibitor still reduces the maximum rate
(D) The non-competitive inhibitor effect is overcome, but the competitive inhibitor still reduces the maximum rate

Q10. Which condition is most likely to denature an enzyme irreversibly?

(A) A small change in substrate concentration
(B) Storage at low temperature
(C) A brief change in light intensity
(D) Extreme pH or high temperature breaking bonds in the tertiary structure

Q11. In industry, enzymes are preferred to inorganic catalysts for many processes because they are what?

(A) Specific, biodegradable and effective at lower temperatures and pressures
(B) Effective at any pH and temperature without denaturing
(C) Cheaper in every case and never inhibited
(D) Able to catalyse any reaction regardless of substrate

Q12. The Michaelis-Menten constant, Km, is defined as the substrate concentration at which the reaction rate is what?

(A) Zero
(B) Half of the maximum rate
(C) Equal to the maximum rate
(D) Independent of enzyme concentration

Cell membranes and transport

Q13. Which process describes the bulk uptake of a large particle by a phagocyte?

(A) Facilitated diffusion
(B) Osmosis
(C) Active transport through a pump
(D) Endocytosis, with membrane extensions engulfing the particle

Q14. A membrane protein that acts as a receptor does what?

(A) Binds a specific signalling molecule, triggering a response inside the cell
(B) Transports water across the membrane by osmosis
(C) Forms the lipid bilayer structure
(D) Synthesises ATP from ADP

Q15. A membrane protein is labelled and tracked over time. It moves sideways within the membrane but rarely flips from one layer to the other. What does this observation support?

(A) Phospholipids are fixed in place and proteins form a continuous layer on the surface
(B) The fluid mosaic model, in which phospholipids and many proteins move laterally in a fluid bilayer
(C) The membrane contains only lipids, with no proteins
(D) The membrane is a rigid, solid structure

The mitotic cell cycle

Q16. Which cells in an adult mammal divide frequently by mitosis?

(A) Skin epidermis and bone marrow cells
(B) Mature red blood cells
(C) Cardiac muscle cells in most adults
(D) Mature neurones

Q17. During interphase, a cell carries out which activities?

(A) Only mitotic division
(B) Normal metabolism, growth and DNA replication in preparation for division
(C) Separation of sister chromatids
(D) Formation of a cleavage furrow only

Q18. A cell with 2n equals 12 chromosomes undergoes mitosis. How many chromosomes will each daughter cell contain?

(A) 6
(B) 24
(C) 12
(D) 3

Nucleic acids and protein synthesis

Q19. RNA differs from DNA in which ways?

(A) RNA is double-stranded and contains thymine
(B) RNA is usually single-stranded, contains ribose and uracil instead of thymine
(C) RNA contains deoxyribose and thymine
(D) RNA is always longer than DNA

Q20. At the ribosome, peptide bond formation joins amino acids in which order?

(A) Random order determined by tRNA abundance
(B) Reverse order to the mRNA sequence
(C) The order specified by the sequence of codons on mRNA
(D) Alphabetical order of amino acid names

Q21. A gene mutation that changes a codon from coding for one amino acid to coding for a different amino acid is called what?

(A) Silent mutation
(B) Nonsense mutation
(C) Frameshift mutation
(D) Missense mutation

Transport in plants

Q22. Which environmental change would reduce transpiration rate most directly?

(A) Increasing wind speed around the leaf
(B) Increasing light intensity
(C) Increasing humidity around the leaf, reducing the water potential gradient
(D) Increasing temperature

Q23. Companion cells support sieve tube elements by doing what?

(A) Providing lignin for strengthening
(B) Carrying water upward under tension
(C) Photosynthesising in the phloem
(D) Carrying out metabolic functions and actively loading sucrose into sieve tubes

Q24. The cohesion-tension theory explains water movement in xylem as being driven mainly by what?

(A) Evaporation from leaves creating tension that pulls a cohesive water column upward
(B) Root pressure pushing water from below
(C) Active pumping by xylem vessel cells
(D) Capillary action alone in narrow vessels

Transport in mammals

Q25. The hepatic portal vein is unusual because it carries blood from where to where?

(A) Lungs to the heart
(B) Heart to the body tissues
(C) Kidneys to the heart
(D) Digestive organs to the liver, before it returns to the heart

Q26. Which statement about haemoglobin loading and unloading is correct?

(A) Haemoglobin loads oxygen in the lungs where oxygen partial pressure is high, and unloads it in respiring tissues where it is low
(B) Haemoglobin loads oxygen in tissues and unloads it in the lungs
(C) Haemoglobin loads carbon dioxide in the lungs
(D) Haemoglobin never unloads oxygen once it is bound

Q27. Blood pressure is highest in which vessels, and why?

(A) Veins, because they carry blood back to the heart
(B) Arteries, because they receive blood directly pumped from the ventricles
(C) Capillaries, because they are narrowest
(D) Lymph vessels, because they drain tissue fluid

Gas exchange

Q28. During forced expiration, which muscles contribute in addition to elastic recoil?

(A) Internal intercostal muscles and abdominal muscles contracting
(B) Diaphragm contracting and flattening
(C) External intercostal muscles contracting
(D) No muscles are involved in expiration

Q29. Which feature of insect tracheae limits their body size?

(A) Tracheae are too efficient for large bodies
(B) Oxygen delivery by diffusion through tracheoles becomes too slow over long distances in large insects
(C) Spiracles cannot open in large insects
(D) Insects have no circulatory system at all

Q30. The surface area to volume ratio falls as an organism gets larger. What is the consequence for gas exchange?

(A) Larger organisms need no specialised exchange surfaces
(B) Larger organisms exchange gases faster by diffusion alone
(C) Larger organisms require specialised exchange surfaces and transport systems
(D) Larger organisms have a higher surface area to volume ratio

Infectious diseases

Q31. Which disease is caused by a virus that is transmitted in droplets and can be prevented by vaccination?

(A) Cholera, caused by a bacterium in water
(B) Measles, caused by a virus spread in airborne droplets
(C) Malaria, caused by a protoctist in mosquitoes
(D) Tuberculosis, caused by a bacterium in droplets

Q32. Which explanation accounts for the delay before antibody levels rise during a first encounter with a pathogen?

(A) Antibody levels rise immediately to a maximum
(B) No memory cells are formed
(C) There is a lag phase while specific lymphocytes are selected and divide, before antibody levels rise
(D) Phagocytes play no role in the first response

Q33. Global travel increases the spread of infectious disease mainly because it does what?

(A) Creates new pathogens in aircraft
(B) Makes vaccines ineffective
(C) Increases mutation rates in all pathogens during flights
(D) Allows infected people to cross continents before symptoms appear, carrying pathogens to new populations

Immunity

Q34. Which type of immunity is provided by antibodies passed from mother to baby in breast milk?

(A) Artificial active immunity
(B) Natural active immunity
(C) Natural passive immunity
(D) Artificial passive immunity

Q35. Which statement about memory cells is correct?

(A) They produce antibodies continuously at high levels for life
(B) They are short-lived and die after the first infection
(C) They are identical to plasma cells in function
(D) They persist after infection and respond rapidly on re-exposure to the same antigen

Q36. Monoclonal antibodies are used in pregnancy tests because they can do what?

(A) Bind specifically to human chorionic gonadotropin (hCG) in urine
(B) Bind to any hormone present in urine
(C) Change colour in the presence of water
(D) Produce hCG themselves

Energy and respiration

Q37. In oxidative phosphorylation, ATP synthase is driven by protons moving in which direction?

(A) From the matrix into the intermembrane space
(B) From the cytoplasm into the mitochondrion
(C) From the matrix into the intermembrane space, down their electrochemical gradient
(D) From the intermembrane space into the matrix, down their electrochemical gradient

Q38. Which respiratory substrate gives a respiratory quotient of approximately 0.7?

(A) Fat, because it is more reduced than carbohydrate
(B) Carbohydrate, because it is already partly oxidised
(C) Protein only, because of deamination
(D) Ethanol, because it is produced anaerobically

Q39. Anaerobic respiration in yeast is used in bread-making because it produces what?

(A) Lactic acid that sours the dough
(B) Carbon dioxide that makes dough rise, and ethanol that evaporates during baking
(C) Oxygen that aerates the dough
(D) Glucose that sweetens the bread

Photosynthesis

Q40. Which factor would increase the rate of photosynthesis in a greenhouse most effectively when light is already saturating?

(A) Increasing carbon dioxide concentration, if it is currently limiting
(B) Decreasing carbon dioxide concentration
(C) Reducing the temperature to near freezing
(D) Removing all chlorophyll from the leaves

Q41. Photolysis is essential for non-cyclic photophosphorylation because it does what?

(A) Produces glucose directly
(B) Replaces electrons lost from photosystem II and supplies protons for ATP synthesis
(C) Fixes carbon dioxide into glycerate 3-phosphate
(D) Regenerates ribulose bisphosphate

Q42. Which statement about the Calvin cycle is correct?

(A) It occurs in the thylakoid membranes and requires light directly
(B) It produces oxygen as a by-product
(C) It is light-independent but depends on ATP and reduced NADP from the light-dependent stage
(D) It fixes oxygen instead of carbon dioxide

Homeostasis

Q43. Which organ is the main site of urea formation, and what process produces it?

(A) Kidney, by filtration of blood
(B) Liver, by deamination of excess amino acids and the ornithine cycle
(C) Pancreas, by insulin secretion
(D) Skin, by sweat production

Q44. Diabetes insipidus differs from diabetes mellitus in that diabetes insipidus involves what?

(A) High blood glucose due to lack of insulin
(B) Excess insulin production
(C) Lack of ADH or kidney insensitivity to ADH, causing large volumes of dilute urine
(D) Autoimmune destruction of pancreatic beta cells only

Q45. Vasoconstriction in cold conditions is best described as what?

(A) Widening of arterioles near the skin surface
(B) Increased sweating from skin glands
(C) Erection of hairs to trap an insulating air layer
(D) Narrowing of arterioles near the skin surface, reducing blood flow and heat loss

Control and coordination

Q46. A patient with cerebellar damage can still move their limbs and think clearly, but their movements are jerky and uncoordinated. Which brain region is most likely damaged, and what is its normal role?

(A) The medulla, controlling heart rate
(B) The hypothalamus, controlling temperature
(C) The cerebellum, which coordinates balance and fine motor control
(D) The cerebrum, controlling conscious thought only

Q47. In the retina, cones are concentrated in the fovea because this arrangement gives what?

(A) Sensitive night vision with no colour discrimination
(B) Low-acuity vision in dim light
(C) Vision only in the peripheral visual field
(D) High-acuity colour vision in the centre of the visual field, with each cone connected to its own bipolar cell

Q48. A drug that blocks acetylcholinesterase at a synapse would have which effect?

(A) Acetylcholine would remain in the cleft longer, prolonging stimulation of the postsynaptic cell
(B) No acetylcholine would be released
(C) Acetylcholine would be broken down faster than normal
(D) The postsynaptic membrane would become permanently impermeable to sodium

Inheritance

Q49. In pea plants, tall (T) is dominant to short (t). A cross between Tt and tt plants gives what phenotypic ratio?

(A) All tall
(B) 3 tall : 1 short
(C) All short
(D) 1 tall : 1 short

Q50. A pea plant carries one allele for tall stems and one for dwarf stems at the same locus. What term describes this genotype, and what does it show about alleles?

(A) Heterozygous: alleles are different forms of the same gene, occupying the same locus on homologous chromosomes
(B) Homozygous for different genes on different chromosomes
(C) Carrying more than two alleles for one gene
(D) Alleles that are always dominant or recessive, never codominant

Q51. A pedigree shows a trait appearing in every generation, affecting males and females, with an affected parent always having an affected child. Which inheritance pattern is most likely?

(A) Autosomal recessive
(B) Autosomal dominant
(C) X-linked recessive
(D) Mitochondrial inheritance only

Selection and evolution

Q52. Which statement best explains why variation is essential for evolution?

(A) Without variation, selection has no differences to act on and allele frequencies cannot change
(B) Variation is created by selection itself
(C) Variation prevents any species from changing
(D) Variation only occurs in asexual species

Q53. Sympatric speciation differs from allopatric speciation in that it occurs without what?

(A) Any genetic change
(B) Geographical isolation
(C) Reproductive isolation
(D) Natural selection

Q54. Which example illustrates sexual selection?

(A) Camouflage matching the background
(B) Antibiotic resistance in bacteria
(C) Elaborate male plumage that increases mating success despite increasing predation risk
(D) Thick fur in cold climates

Classification, biodiversity and conservation

Q55. Why is species richness alone an incomplete measure of biodiversity?

(A) It is impossible to count species in any habitat
(B) It counts species but ignores how many individuals of each species are present
(C) It always overestimates genetic diversity
(D) It ignores the names of species

Q56. Which practice is an example of sustainable use of a resource?

(A) Clear-felling a forest with no replanting
(B) Overfishing a stock beyond its recovery rate
(C) Harvesting timber at a rate that allows regrowth, with replanting and protection of key habitats
(D) Draining a wetland completely for farming

Q57. Captive breeding programmes aim to maintain genetic diversity by doing what?

(A) Breeding only the most closely related individuals
(B) Selecting for a single desirable trait
(C) Keeping populations as small as possible
(D) Managing pairings with studbooks to avoid inbreeding and preserve rare alleles

Genetic technology

Q58. In genetic engineering, why are marker genes included in a plasmid vector?

(A) They make bacteria resistant to all antibiotics permanently
(B) They produce the desired protein product directly
(C) They allow transformed bacteria that took up the plasmid to be identified, for example by antibiotic resistance
(D) They cut the plasmid at the insertion site

Q59. Which step in PCR occurs at the lowest temperature?

(A) Denaturation of DNA
(B) Extension by DNA polymerase
(C) Initial heating to activate the enzyme
(D) Annealing of primers to template strands

Q60. An ethical concern about GM crops is which issue?

(A) GM crops may cross-pollinate with wild relatives or affect non-target organisms, with effects that are hard to reverse
(B) GM crops may increase yields in poor soils
(C) GM crops may reduce food prices for consumers
(D) GM crops may reduce the need for some pesticides

Answer Key

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

Q9: C	Q19: B	Q29: B	Q39: B	Q49: D	Q59: D
Q10: D	Q20: C	Q30: C	Q40: A	Q50: A	Q60: A

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-20/