A-Level Biology Practice Test 17

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. A cell is 40 micrometres long in reality and appears 20 millimetres long in a micrograph. What is the magnification of the micrograph?

(A) x500
(B) x50
(C) x5000
(D) x200

Q2. Cell fractionation followed by ultracentrifugation separates organelles mainly on the basis of what?

(A) Their colour under the light microscope
(B) Their density and size
(C) Their charge in an electric field
(D) Their solubility in water

Q3. Which combination of features is found in a typical plant cell but not in a typical animal cell?

(A) Mitochondria and a nucleus
(B) Ribosomes and a cell surface membrane
(C) Cellulose cell wall, chloroplasts and a large permanent vacuole
(D) Golgi apparatus and smooth endoplasmic reticulum

Biological molecules

Q4. Water has a high specific heat capacity. What is the biological significance of this property?

(A) It allows water to dissolve large non-polar molecules easily
(B) It buffers organisms against rapid temperature changes
(C) It makes water a poor transport medium in blood
(D) It prevents hydrogen bonds forming between water molecules

Q5. The tertiary structure of a protein is maintained by which interactions?

(A) Only peptide bonds between adjacent amino acids
(B) Only hydrogen bonds between polypeptide backbones
(C) Hydrogen bonds, ionic bonds, disulfide bridges and hydrophobic interactions between R groups
(D) Glycosidic bonds between amino acid side chains

Q6. A fatty acid chain with two double bonds is compared with a saturated chain of the same length. Which property would the unsaturated chain have, and why?

(A) Saturated fatty acids contain carbon-carbon double bonds that kink the chain
(B) Unsaturated fatty acids are usually solid at room temperature
(C) Saturated fatty acids cannot form ester bonds with glycerol
(D) A lower melting point, because its double bonds kink the chain so it packs less tightly

Enzymes

Q7. On a graph of reaction rate against substrate concentration, what does a lower Km value indicate about an enzyme?

(A) It is denatured at low substrate concentration
(B) It has a lower maximum rate than other enzymes
(C) It has a higher affinity for its substrate, reaching half its maximum rate at a lower concentration
(D) It requires a higher temperature to function

Q8. Why does raising temperature above the optimum reduce enzyme activity sharply?

(A) Substrate molecules stop colliding with the enzyme
(B) The activation energy of the reaction increases permanently
(C) The enzyme becomes a competitive inhibitor of itself
(D) Bonds holding the tertiary structure break, distorting the active site

Q9. The induced-fit model improves on the lock-and-key model by proposing what?

(A) The active site changes shape slightly to fit the substrate more closely when it binds
(B) The substrate changes the enzyme into a different protein entirely
(C) Enzymes bind permanently to their products
(D) Only one enzyme molecule can act on a substrate at a time

Cell membranes and transport

Q10. Cholesterol in a cell membrane has which dual effect on fluidity?

(A) It makes the membrane completely rigid at all temperatures
(B) It replaces all phospholipids in animal cell membranes
(C) It makes the membrane freely permeable to ions
(D) It restricts phospholipid movement at high temperature but prevents tight packing at low temperature

Q11. A plant cell placed in pure water becomes turgid. Which statement explains this correctly in terms of water potential?

(A) Water moves by osmosis from higher water potential outside to lower water potential inside, until the wall resists further entry
(B) Water moves by active transport against its water potential gradient
(C) Solutes move out of the cell until the potentials are equal
(D) The cell wall becomes permeable to sucrose, raising internal water potential

Q12. Exocytosis is best described as which process?

(A) Uptake of dissolved substances through channel proteins

(B) Fusion of a vesicle with the cell surface membrane, releasing its contents outside the cell

(C) Engulfing a whole bacterium by extensions of the membrane

(D) Passive diffusion of lipid-soluble molecules through the bilayer

The mitotic cell cycle

Q13. What happens during cytokinesis in a plant cell that does not occur in an animal cell?

(A) A cell plate forms across the equator and develops into a new cell wall

(B) The cell membrane pinches inward to form a cleavage furrow

(C) The nuclear envelope breaks down completely

(D) Spindle fibres attach to centromeres

Q14. Checkpoints in the cell cycle are important because they do what?

(A) Speed up mitosis regardless of DNA damage

(B) Halt the cycle if DNA is damaged or replication is incomplete, allowing repair before division

(C) Ensure that meiosis rather than mitosis always occurs

(D) Prevent any cell from ever dividing more than once

Q15. A researcher cultures unspecialised cells from an embryo and induces them to form nerve cells in the laboratory. Which conclusion is supported by this result?

(A) Specialised cells cannot divide under any conditions

(B) Embryonic stem cells divide only by meiosis

(C) Embryonic stem cells are unspecialised cells that can divide and differentiate into specialised cell types

(D) Stem cells are found only in plant meristems

Nucleic acids and protein synthesis

Q16. During DNA replication, what is the role of DNA polymerase?

(A) It unwinds the double helix ahead of the replication fork

(B) It adds complementary nucleotides to the growing new strand and proofreads the sequence

(C) It joins Okazaki fragments on the lagging strand

(D) It separates the two template strands by breaking hydrogen bonds

Q17. Transcription differs from replication in that transcription produces what?

(A) Two identical DNA molecules

(B) A new polypeptide chain directly

(C) A single-stranded mRNA copy of one gene, using only one DNA strand as a template

(D) A complete copy of the entire genome

Q18. A deletion of three bases from a coding sequence may have a relatively mild effect because it does what?

(A) It changes every codon downstream of the deletion
(B) It introduces a premature stop codon in every case
(C) It prevents transcription of the gene entirely
(D) It removes one amino acid but preserves the reading frame for the rest of the protein

Transport in plants

Q19. Xylem vessels are adapted for water transport by which combination of features?

(A) Living cells with many mitochondria and sieve plates
(B) Thin cellulose walls and a large central vacuole
(C) Dead, hollow, lignified tubes with no end walls and pits in their sides
(D) Companion cells that actively load sucrose into the vessels

Q20. A leaf is placed in bright light with still, humid air, then the same leaf is exposed to a breeze. How does the breeze change transpiration, and why?

(A) High humidity around the leaf increases transpiration
(B) Low temperature and still air increase transpiration
(C) Stomata closed by abscisic acid increase transpiration
(D) Wind removes humid air from around the leaf, steepening the water potential gradient so water evaporates faster

Q21. Mineral ions enter root hair cells from soil water that is more dilute than the cell sap. Which process must be involved?

(A) Active transport, using ATP to move ions against their concentration gradient
(B) Simple diffusion through the lipid bilayer
(C) Osmosis through aquaporins
(D) Transpiration pull alone, without any membrane transport

Transport in mammals

Q22. Which structural feature of arteries suits them for carrying blood at high pressure?

(A) Thin walls with few elastic fibres
(B) Valves throughout their length
(C) A wide lumen and porous walls
(D) Thick walls with smooth muscle and elastic tissue that stretch and recoil

Q23. Veins return blood to the heart at low pressure. Which feature prevents backflow in veins?

(A) Valves formed from folds of the inner wall
(B) Thick muscular walls that pump blood actively
(C) Narrow lumens that increase blood velocity
(D) Elastic tissue that generates high pressure

Q24. At the venule end of a capillary, tissue fluid is reabsorbed mainly because of which force?

(A) High hydrostatic pressure pushing fluid out of the capillary
(B) Lower hydrostatic pressure and the water potential gradient created by plasma proteins remaining in the blood
(C) Active pumping of fluid back through the capillary wall
(D) Lymph vessels forcing fluid into the capillary

Gas exchange

Q25. Which adaptation of the mammalian gas exchange surface reduces the diffusion distance?

(A) Alveolar walls and capillary walls each one cell thick, giving a total barrier of about two cells
(B) A thick layer of cartilage around each alveolus
(C) Mucus lining the alveoli to trap dust
(D) A large volume of air remaining in the lungs after expiration

Q26. Why does a mammal ventilate its lungs rather than relying on diffusion alone?

(A) Lungs cannot exchange gases without muscular effort at any size
(B) Diffusion is too slow over the large body size and high metabolic rate of mammals
(C) Ventilation increases the surface area of the alveoli
(D) Diffusion only works in water, not in air

Q27. During vigorous exercise, breathing rate and depth increase. What is the main stimulus for this change?

(A) A fall in blood glucose concentration
(B) A rise in blood oxygen concentration
(C) A rise in blood carbon dioxide concentration and a fall in pH detected by chemoreceptors
(D) A fall in body temperature

Infectious diseases

Q28. Tuberculosis is caused by a bacterium that infects the lungs. Which control measure is most important in preventing its spread in crowded housing?

(A) Adding chlorine to drinking water
(B) Improving ventilation, reducing overcrowding, and identifying and treating cases early
(C) Using insecticide-treated bed nets
(D) Quarantining all farm animals in the area

Q29. In the life cycle of Plasmodium, which stage occurs in the mosquito and produces the infective form?

(A) Schizogony in liver cells producing merozoites
(B) Formation of gametocytes in human red blood cells
(C) Sexual reproduction in the mosquito gut, followed by sporozoite formation in the salivary glands
(D) Asexual reproduction in the mosquito salivary glands only

Q30. Why is it difficult to produce a long-lasting vaccine against HIV?

(A) HIV is not transmitted between people
(B) HIV cannot be grown in laboratory cultures
(C) HIV infects only non-immune cells
(D) HIV mutates rapidly, changing its surface antigens, and it attacks the immune system itself

Immunity

Q31. Which cells are responsible for the non-specific engulfing and digestion of pathogens?

(A) Plasma cells
(B) Memory B cells
(C) Phagocytes such as neutrophils and macrophages
(D) Helper T cells only

Q32. An antibody molecule has two antigen-binding sites because of which structural feature?

(A) It is made of a single heavy chain only
(B) It has no variable regions
(C) It is composed only of carbohydrate chains
(D) It has two identical heavy chains and two identical light chains arranged in a Y shape

Q33. Monoclonal antibodies are produced by hybridoma cells. What are hybridoma cells?

(A) Fusions of a specific B lymphocyte with a myeloma (cancer) cell, combining antibody specificity with continuous division
(B) Viruses engineered to carry antibody genes
(C) Plant cells genetically modified to produce antibodies
(D) T cells that have been cloned in tissue culture

Q34. Artificial passive immunity, such as antivenom injection, differs from artificial active immunity in that it does what?

(A) Provides ready-made antibodies immediately but gives no memory cells and short-lived protection
(B) Stimulates the recipient to produce their own antibodies and memory cells
(C) Requires exposure to the live pathogen
(D) Protects for the whole lifetime of the recipient

Energy and respiration

Q35. In the Krebs cycle, what happens to acetyl coenzyme A when it enters the cycle?

(A) It is converted directly to glucose
(B) It is reduced to lactate
(C) It combines with oxygen to form water immediately
(D) It is oxidised to carbon dioxide in a series of steps, releasing reduced coenzymes

Q36. Which organelle is the site of the Krebs cycle and oxidative phosphorylation?

(A) Mitochondrion, with the Krebs cycle in the matrix and electron transport on the cristae
(B) Chloroplast, with the cycle in the stroma
(C) Nucleus, with the cycle in the nucleoplasm
(D) Golgi apparatus, with the cycle in its cisternae

Q37. Yeast carrying out anaerobic respiration produces ethanol and carbon dioxide. What limits the eventual yield of ethanol in a fermenter?

(A) Exhaustion of oxygen supply
(B) Accumulation of ethanol, which eventually inhibits and kills the yeast
(C) Lack of glucose transporters in yeast cells
(D) Absence of mitochondria in yeast

Q38. A respiratory quotient (RQ) of 1.0 indicates that the main respiratory substrate is which substance?

(A) Fat, because fats contain relatively little oxygen
(B) Protein, because amino acids must first be deaminated
(C) Anaerobic glucose breakdown only
(D) Carbohydrate, because equal volumes of carbon dioxide are produced and oxygen consumed

Photosynthesis

Q39. Which pigment absorbs light most strongly in the blue and red regions but reflects green light?

(A) Chlorophyll a and chlorophyll b
(B) Carotene only, which absorbs green light
(C) Anthocyanin in all leaves at all times
(D) Xanthophyll, which reflects blue light

Q40. A limiting factor for photosynthesis is best defined as a factor that does what?

(A) Is always present in excess in the environment
(B) Is closest to its minimum value and therefore controls the overall rate
(C) Only affects the light-dependent stage
(D) Has no effect until all other factors are optimal

Q41. In a chloroplast, the light-dependent reactions occur on which structures, and the Calvin cycle occurs where?

(A) Stroma for both stages
(B) Grana for both stages
(C) Thylakoid membranes for the light-dependent stage and the stroma for the Calvin cycle
(D) Outer membrane for the light stage and the inner membrane for the Calvin cycle

Q42. At very high light intensity, the rate of photosynthesis may plateau even though light increases. What best explains the plateau?

(A) Chlorophyll is destroyed by all bright light
(B) Another factor, such as carbon dioxide concentration or temperature, has become limiting
(C) Stomata open wider and lose too much water
(D) The plant stops producing ATP entirely

Homeostasis

Q43. In thermoregulation, vasoconstriction in cold conditions helps maintain core temperature by doing what?

(A) Increasing blood flow to the skin to lose heat
(B) Reducing blood flow to the skin, so less heat is lost to the environment
(C) Increasing sweat production
(D) Causing shivering in the skin itself

Q44. Type 1 diabetes differs from type 2 diabetes in that type 1 involves what?

(A) Insulin receptors becoming insensitive over time
(B) Excess insulin production by the pancreas
(C) Autoimmune destruction of beta cells in the islets of Langerhans, so little or no insulin is produced
(D) A complete inability to absorb glucose from the gut

Q45. Selective reabsorption in the proximal convoluted tubule recovers which substances almost completely?

(A) Urea and excess water only
(B) Plasma proteins and red blood cells
(C) Creatinine and toxins
(D) Glucose, amino acids, ions and much of the water

Control and coordination

Q46. Saltatory conduction is faster than continuous conduction because of which feature?

(A) Myelin allows ions to pass freely through the sheath
(B) The axon diameter is always smaller in myelinated neurones
(C) Action potentials are generated only at nodes of Ranvier, jumping between them
(D) Neurotransmitter is released along the whole axon

Q47. In a reflex arc, which neurone carries the impulse from the receptor toward the central nervous system?

(A) Motor neurone
(B) Relay neurone in the spinal cord only
(C) Effector neurone
(D) Sensory neurone

Q48. Rod cells differ from cone cells in the retina in that rods do what?

(A) Function in dim light and give low-acuity, colourless vision, with many rods converging on one bipolar cell
(B) Function only in bright light and give colour vision
(C) Are concentrated in the fovea for sharp central vision
(D) Contain iodopsin and respond to specific wavelengths

Inheritance

Q49. Genes that are linked on the same chromosome do not assort independently. How can new combinations still arise?

(A) By independent assortment of homologous chromosomes only
(B) By mutation of both genes in every gamete
(C) By random fertilisation alone
(D) By crossing over between non-sister chromatids during prophase I of meiosis

Q50. A test cross is used to determine the genotype of an organism showing a dominant phenotype. What is crossed with it?

(A) A homozygous recessive individual
(B) A heterozygous individual for the same gene
(C) A homozygous dominant individual
(D) An individual with an unrelated phenotype

Q51. In humans, ABO blood groups show multiple alleles. How many alleles for this gene are commonly recognised?

(A) Two: A and B only
(B) Three: IA, IB and IO
(C) Four: A, B, AB and O
(D) One, with four different phenotypes

Selection and evolution

Q52. Allopatric speciation occurs when what happens?

(A) A population is split by a geographical barrier, and the separated groups diverge until they can no longer interbreed
(B) A new species arises within the same area without any barrier
(C) Two species hybridise to form a third species immediately
(D) A single mutation creates a new species in one generation in all cases

Q53. The founder effect is an example of genetic drift that occurs when what happens?

(A) A large population undergoes strong directional selection
(B) A small group colonises a new area, carrying only a sample of the original gene pool
(C) Mutations increase genetic diversity in a stable population
(D) Gene flow between two large populations increases

Q54. Which evidence best supports evolution by natural selection in the peppered moth?

(A) Moths changed colour during their own lifetimes to match tree bark
(B) Dark moths were created by pollution itself
(C) The frequency of dark moths rose in polluted areas where they were better camouflaged from predators, then fell as air cleaned up
(D) Light moths migrated away from polluted areas permanently

Classification, biodiversity and conservation

Q55. Molecular evidence, such as DNA base sequences, is used in classification because it can do what?

(A) Replace the need for any morphological evidence in all cases
(B) Reveal evolutionary relationships even when organisms look similar or very different due to convergence
(C) Prove that all species in a genus are identical
(D) Show the exact age of every fossil

Q56. A seed bank is an example of ex situ conservation. What is its main advantage?

(A) It preserves species in their natural ecosystems
(B) It allows natural selection to continue unchanged
(C) It stores genetic diversity cheaply and safely for future restoration, even if wild populations are lost
(D) It maintains all ecological interactions of the species

Q57. Which human activity is the greatest current driver of biodiversity loss worldwide?

(A) Scientific research in remote habitats
(B) Captive breeding programmes
(C) Small-scale ecotourism
(D) Habitat destruction, including deforestation and land conversion for agriculture

Genetic technology

Q58. In gel electrophoresis, DNA fragments separate mainly because of what?

(A) Their base sequence, with adenine-rich fragments moving fastest
(B) Their colour under ultraviolet light
(C) Their size, with smaller fragments moving further through the gel toward the positive electrode
(D) Their double-stranded shape only, regardless of length

Q59. DNA profiling can identify an individual because it examines which regions of the genome?

(A) Only protein-coding genes that are identical in all people
(B) Mitochondrial genes inherited only from the father
(C) Regions that code for eye colour alone
(D) Highly variable non-coding regions, such as short tandem repeats, which differ between unrelated people

Q60. A genetically modified crop carrying a gene for insect resistance could benefit farmers by doing what?

(A) Reducing the need for chemical insecticide applications and crop losses to pests
(B) Eliminating the need for any water or fertiliser
(C) Making the crop immune to all diseases and drought
(D) Preventing any gene flow to wild relatives

Answer Key

Q1: A	Q11: A	Q21: A	Q31: C	Q41: C	Q51: B

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

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-17/