

Biology Model Paper (Grade 12)

MCQs

Q1. Properties of an effective respiratory surface include all of the following EXCEPT:

- a) Permeable
- b) Thin
- c) Large surface area
- d) Poor blood supply

Q2. In a healthy adult at rest, the tidal volume (TV) is approximately:

- a) 100 mL
- b) 500 mL
- c) 1000 mL
- d) 3000 mL

Q3. The nephron part that connects directly to the collecting duct is:

- a) Bowman's capsule
- b) Loop of Henle
- c) Proximal convoluted tubule
- d) Distal convoluted tubule

Q4. When a person bends (flexes) his knee, the muscle that acts as an antagonist is:

- a) Quadriceps femoris
- b) Hamstrings
- c) Triceps brachii
- d) Biceps brachii

Q5. The Na^+/K^+ -ATPase maintains the resting membrane potential by pumping:

- a) 2 Na^+ in and 3 K^+ out
- b) 3 Na^+ out and 2 K^+ in
- c) Equal Na^+ and K^+
- d) 3 Na^+ in and 2 K^+ out

Q6. Ions most commonly responsible for inhibitory postsynaptic potentials (IPSPs) are:

- a) K^+
- b) Cl^-
- c) Na^+
- d) K^+ and Cl^-

Q7. Animal behaviour is influenced by:

- a) Genes only
- b) Environment only
- c) Both genes and environment
- d) Chemicals only

Q8. In vitro fertilization (IVF) or test tube baby is most likely recommended when:

- a) The woman is already pregnant
- b) Sperm count is high
- c) The fallopian tubes are blocked
- d) Both fallopian tubes are intact

Q9. Features typically associated with ageing include all of the following EXCEPT:

- a) Decreased energy
- b) Declining vision
- c) Sexual dysfunction
- d) Increased energy and vigour

Q10. In humans, a neonatal head proportionally larger than the body illustrates:

- a) Isometric growth
- b) Allometric growth
- c) Negative growth
- d) No growth

Q11. In a dihybrid cross between a plant with round yellow seeds (RRYY) and wrinkled green seeds (rryy), what proportion of F₂ progeny will have round green seeds?

- a) 3/16
- b) 9/16
- c) 1/16
- d) 4/16

Q12. Erythroblastosis foetalis occurs due to incompatibility between Rh- mother and Rh+ foetus. Which preventive measure is used to prevent its occurrence?

- a) Iron supplements
- b) Anti-Rh (anti-D) immunoglobulin
- c) Vitamin B₁₂
- d) Exchange transfusion

Q13. Clinical features commonly associated with Klinefelter syndrome (47, XXY) include all of the following EXCEPT:

- a) Infertility
- b) Higher pitch of voice
- c) Dwarfism
- d) Little facial hair

Q14. "Junk DNA" most commonly refers to:

- a) Useful sequences of DNA
- b) Useless sequences of DNA
- c) DNA destroyed during cell division
- d) Bacterial DNA only

Q15. Large ears in the kit fox (heat loss) and thick fur in the red fox (insulation) exemplify:

- a) Convergent evolution
- b) Divergent evolution
- c) Co-evolution
- d) No evolution

Q16. When population size N reaches the carrying capacity (K), the population typically:

- a) Grows exponentially
- b) Stabilizes (net growth ≈ 0)
- c) Grows at maximum rate
- d) Has zero mortality

Q17. A genomic library is primarily used to:

- a) Store and represent the DNA fragments of an organism
- b) Produce proteins directly
- c) Amplify RNA sequences
- d) Measure cell growth

Q18. The main goal of gene therapy in cystic fibrosis is to:

- a) Treat symptoms only
- b) Deliver a functional CFTR gene
- c) Increase mucus production
- d) Reduce blood sugar

BIOLOGY GRADE 12 MODEL PAPER

Section-B

Q.2. Attempt any **TEN** parts. All parts carry equal marks.

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| i. | Briefly explain how carbon dioxide is transported in human blood through bicarbonate ions and carbaminohemoglobin. | (2+2) |
| ii. | Discuss ultrafiltration and tubular secretion as events in the excretory function of the nephron. | (2+2) |
| iii. | State any four differences between tetanus and tetany as muscle disorders. | (1+1+1+1) |
| iv. | Define threshold and subthreshold stimuli. How does a threshold stimulus play a role in depolarization? | (1+1+2) |
| v. | Define insulin and glucagon. Discuss their roles in diabetes mellitus and during fasting. | (1+1+1+1) |
| vi. | State any four differences between classical conditioning and operant conditioning. | (1+1+1+1) |
| vii. | What is miscarriage? State its causes and explain its conceptual distinction from induced abortion. | (2+1+1) |
| viii. | Define epistasis. How is it different from dominance? | (2+2) |
| ix. | Differentiate between the genetic code and a codon (any four points). | (1+1+1+1) |
| x. | Explain the role of endosymbiosis and membrane infolding in the origin of the eukaryotic cell. | (2+2) |
| xi. | Define succession. Which type of succession begins on a bare rock surface? | (2+2) |
| xii. | What is PCR? Predict the outcome if Taq polymerase loses its thermostability during the process. | (2+2) |
| xiii. | What are microbes? Describe their role in the pharmaceutical industry. | (2+2) |

Section-C — ERQs

Note: Attempt **THREE** questions. All questions carry equal marks.

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| Q.3.a) | Differentiate between haemoglobin and myoglobin on the basis of structure, location, function, oxygen affinity, and physiological importance. | (1+1+1+1+1) |
| b) | List any four differences between osmoregulators and osmoconformers. | (1+1+1+1) |
| Q.4.a) | Explain joint dislocation with reference to definition, causes, symptoms, common sites, and treatment. | (1+1+1+1+1) |
| b) | Differentiate between agonistic behaviour and altruistic behaviour (any four points). | (1+1+1+1) |
| Q.5.a) | Describe the structure and function of gustatory and olfactory receptors. | (2.5+2.5) |
| b) | What is embryonic induction? List the three mechanisms by which signals pass between cells to induce development. | (1+3) |
| Q.6.a) | What is the Human Genome Project (HGP)? Enumerate its goals and any four benefits. | (1+2+1+1=5) |
| b) | What is a polygenic trait? Discuss human skin colour as an example of polygenic inheritance. | (2+2) |