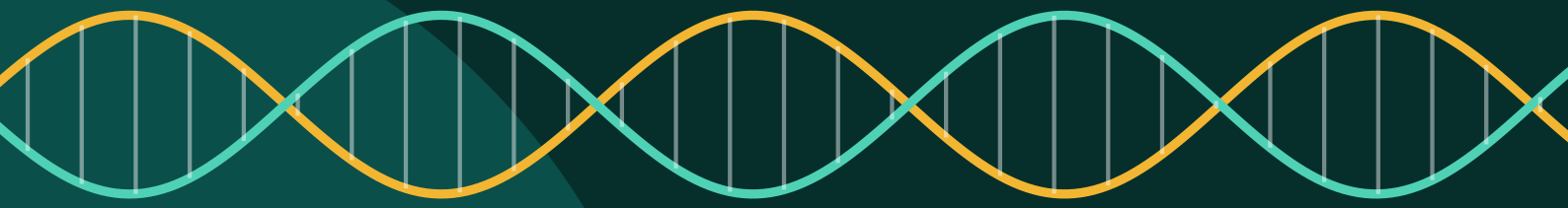
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BIOLOGY MCQs

60 Solved Questions with Answers and Detailed Explanations



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1 Cell Biology

Q1. Which organelle is known as the powerhouse of the cell?

A. Ribosome

B. **Mitochondrion** ✓

C. Golgi apparatus

D. Lysosome

Explanation: Mitochondria generate most of the cell's ATP through oxidative phosphorylation, which is why they are called the powerhouse of the cell.

Q2. Protein synthesis takes place on which cell structure?

- **A** **Ribosomes** ✓
- **B** Peroxisomes
- **C** Centrioles
- **D** Vacuoles

Explanation: Ribosomes read mRNA and join amino acids into polypeptide chains, making them the site of translation.

Q3. Which organelle contains hydrolytic enzymes and is called the suicidal bag?

A Peroxisome

B Chloroplast

C **Lysosome** ✓

D Nucleolus

Explanation: Lysosomes contain digestive enzymes that can break down cell components. If they burst, the cell digests itself.

Q4. The main component of the plant cell wall is:

A Chitin

B **Cellulose** ✓

C Peptidoglycan

D Lignin only

Explanation: Plant cell walls are made mainly of cellulose microfibrils. Chitin is found in fungi and peptidoglycan in bacteria.

Q5. The fluid mosaic model of the plasma membrane was proposed by:

A Watson and Crick

B Schleiden and Schwann

C **Singer and Nicolson** ✓

D Robertson

Explanation: Singer and Nicolson (1972) described the membrane as a fluid lipid bilayer with proteins floating in it like a mosaic.

Q6. During which phase of mitosis do chromosomes align at the cell's equator?

A Prophase

B **Metaphase** ✓

C Anaphase

D Telophase

Explanation: In metaphase the chromosomes line up on the metaphase plate, attached to spindle fibres at their centromeres.

Q7. How many chromosomes are present in a normal human somatic cell?

A 23

B 44

C **46** ✓

D 48

Explanation: Humans have 23 pairs of chromosomes, so a diploid somatic cell has 46 in total.

Q8. Crossing over occurs during which stage?

A. Leptotene

B. Zygotene

C. **Pachytene** ✓

D. Diakinesis

Explanation: Crossing over between non-sister chromatids of homologous chromosomes takes place at pachytene of prophase I.

Q9. Centrioles show which arrangement of microtubules?

A. 9+2

B. **9+0** ✓

C. 2+9

D. 6+3

Explanation: A centriole has nine triplets of microtubules arranged in a ring with none in the centre (9+0). Cilia and flagella show 9+2.

Q10. Which organelle is the main site of lipid synthesis?

A. Rough ER

B. **Smooth ER** ✓

C. Lysosome

D. Nucleus

Explanation: The smooth endoplasmic reticulum lacks ribosomes and synthesises lipids, steroids and phospholipids.

2 Biomolecules

Q11. The most abundant protein on Earth is:

A Haemoglobin

B Collagen

C **RuBisCO** ✓

D Insulin

Explanation: RuBisCO, the enzyme that fixes carbon dioxide in photosynthesis, is considered the most abundant protein in the biosphere.

Q12. Most enzymes are chemically:

A Lipids

B **Proteins** ✓

C Carbohydrates

D Nucleic acids only

Explanation: Almost all enzymes are globular proteins. Only a few catalytic RNAs (ribozymes) are exceptions.

Q13. Amino acids are joined together by which bond?

A Glycosidic bond

B Ester bond

C **Peptide bond** ✓

D Hydrogen bond

Explanation: A peptide bond forms between the carboxyl group of one amino acid and the amino group of the next.

Q14. Which polysaccharide is the storage form of glucose in animals?

A. Starch

B. **Glycogen** ✓

C. Cellulose

D. Inulin

Explanation: Animals store excess glucose as glycogen, mainly in the liver and muscles. Starch is the plant storage form.

Q15. The sugar present in DNA is:

A Ribose

B **Deoxyribose** ✓

C Fructose

D Glucose

Explanation: DNA contains deoxyribose, which lacks the oxygen on the 2' carbon that ribose has.

Q16. Deficiency of which vitamin causes scurvy?

A Vitamin A

B Vitamin B12

C **Vitamin C** ✓

D Vitamin D

Explanation: Vitamin C is needed for collagen formation. Its deficiency causes bleeding gums and poor wound healing, known as scurvy.

Q17. In DNA, adenine pairs with:

A Guanine

B Cytosine

C Uracil

D **Thymine** ✓

Explanation: Adenine pairs with thymine through two hydrogen bonds. In RNA, adenine pairs with uracil.

Q18. A competitive inhibitor of an enzyme:

A **Binds to the active site** ✓

B Denatures the enzyme

C Binds far from the active site

D Increases Vmax

Explanation: A competitive inhibitor resembles the substrate and competes for the active site, so it raises Km without changing Vmax.

3 Genetics and Molecular Biology

Q19. Who is regarded as the Father of Genetics?

A. Charles Darwin

B. **Gregor Mendel** ✓

C. T. H. Morgan

D. Hugo de Vries

Explanation: Gregor Mendel worked out the basic laws of inheritance from his experiments on pea plants.

Q20. The phenotypic ratio of a monohybrid cross in the F2 generation is:

A 1:1

B 9:3:3:1

C **3:1** ✓

D 1:2:1

Explanation: Crossing two heterozygotes (Tt x Tt) gives three dominant-looking offspring for every one recessive, a 3:1 ratio.

Q21. A test cross is a cross between:

A. Two homozygous dominant plants

B. **F1 hybrid and the recessive parent** ✓

C. Two F1 hybrids

D. F2 and the dominant parent

Explanation: Crossing an individual of unknown genotype with a homozygous recessive reveals whether it is homozygous or heterozygous.

Q22. Down syndrome is caused by trisomy of chromosome:

A 13

B 18

C **21** ✓

D 23

Explanation: Down syndrome results from an extra copy of chromosome 21, giving a total of 47 chromosomes.

Q23. Turner syndrome has which chromosome constitution?

A. 47, XXY

B. **45, XO** ✓

C. 47, XXX

D. 46, XY

Explanation: Females with Turner syndrome have a single X chromosome (44 + XO), giving 45 chromosomes.

Q24. Which sequence represents the central dogma of molecular biology?

A. RNA -> DNA -> Protein

B. Protein -> RNA -> DNA

C. **DNA -> RNA -> Protein** ✓

D. DNA -> Protein -> RNA

Explanation: Genetic information flows from DNA to RNA by transcription and from RNA to protein by translation.

Q25. The start codon in the genetic code is:

A. UAA

B. **AUG** ✓

C. UGA

D. GGG

Explanation: AUG codes for methionine and marks the start of translation. UAA, UAG and UGA are stop codons.

Q26. Which enzyme joins the Okazaki fragments?

A. DNA polymerase

B. Helicase

C. Primase

D. **DNA ligase** ✓

Explanation: DNA ligase seals the nicks between Okazaki fragments on the lagging strand.

Q27. Haemophilia is an example of:

A. Autosomal dominant disorder

B. **X-linked recessive disorder** ✓

C. Y-linked disorder

D. Chromosomal aneuploidy

Explanation: The gene for blood clotting factors is on the X chromosome and the trait is recessive, so males are affected more often.

Q28. The phenotypic ratio of a dihybrid cross in the F2 generation is:

A 3:1

B 1:2:1

C **9:3:3:1** ✓

D 1:1:1:1

Explanation: Mendel's law of independent assortment gives a 9:3:3:1 ratio when two heterozygous pairs of traits are crossed.

4 Human Physiology

Q29. Which hormone lowers blood glucose level?

A. Glucagon

B. **Insulin** ✓

C. Adrenaline

D. Cortisol

Explanation: Insulin from the beta cells of the pancreas helps cells take up glucose and promotes its storage as glycogen.

Q30. The structural and functional unit of the kidney is:

A Neuron

B **Nephron** ✓

C Alveolus

D Villus

Explanation: Each kidney contains about a million nephrons, which filter blood and form urine.

Q31. Which is the largest gland in the human body?

A Pancreas

B Thyroid

C **Liver** ✓

D Pituitary

Explanation: The liver is the largest gland and has many roles, including bile production and detoxification.

Q32. The natural pacemaker of the human heart is:

A. AV node

B. **SA node** ✓

C. Bundle of His

D. Purkinje fibres

Explanation: The sinoatrial (SA) node generates the electrical impulses that set the heart rate.

Q33. Oxygen is mainly transported in blood by:

A. Plasma

B. **Haemoglobin** ✓

C. Platelets

D. White blood cells

Explanation: Haemoglobin in red blood cells binds oxygen to form oxyhaemoglobin in the lungs.

Q34. Which blood group is the universal donor?

A. AB positive

B. A negative

C. B positive

D. **O negative** ✓

Explanation: O negative red cells have no A, B or Rh antigens, so they can be given to almost any recipient.

Q35. Fertilization in humans normally occurs in the:

A. Uterus

B. **Ampulla of the fallopian tube** ✓

C. Vagina

D. Ovary

Explanation: The sperm and ovum meet in the ampulla, the widest part of the fallopian tube.

Q36. Which hormone prepares the body for 'fight or flight'?

A **Adrenaline** ✓

B Thyroxine

C Insulin

D Oxytocin

Explanation: Adrenaline from the adrenal medulla raises heart rate and blood glucose to prepare for emergencies.

Q37. Which enzyme in saliva starts the digestion of starch?

A Pepsin

B Lipase

C **Salivary amylase** ✓

D Trypsin

Explanation: Salivary amylase (ptyalin) breaks starch into maltose in the mouth.

Q38. Which part of the brain coordinates balance and posture?

A. Cerebrum

B. **Cerebellum** ✓

C. Medulla oblongata

D. Thalamus

Explanation: The cerebellum coordinates movement, balance and muscle tone.

Q39. The normal pH of human blood is about:

A. 6.4

B. **7.4** ✓

C. 8.4

D. 5.4

Explanation: Blood pH is kept in a narrow range of 7.35 to 7.45 by buffers, the lungs and the kidneys.

Q40. Antibodies are produced by:

A Red blood cells

B Platelets

C **Plasma cells (B lymphocytes)** ✓

D Neutrophils

Explanation: B lymphocytes differentiate into plasma cells, which secrete antibodies against specific antigens.

5 Plant Biology

Q41. The light reactions of photosynthesis occur in the:

A Stroma

B **Thylakoid membranes** ✓

C Matrix

D Cytoplasm

Explanation: The light reactions take place in the thylakoid membranes of the grana, where chlorophyll captures light.

Q42. Which is the primary photosynthetic pigment?

A. Carotene

B. Xanthophyll

C. **Chlorophyll a** ✓

D. Anthocyanin

Explanation: Chlorophyll a is the main pigment that takes part directly in the light reactions. Others are accessory pigments.

Q43. Which plant hormone promotes cell elongation?

A. **Auxin** ✓

B. Abscisic acid

C. Ethylene

D. Cytokinin

Explanation: Auxin promotes cell elongation in stems and apical dominance.

Q44. The fruit-ripening hormone is:

A Gibberellin

B Cytokinin

C **Ethylene** ✓

D Auxin

Explanation: Ethylene is a gaseous hormone that speeds up fruit ripening and leaf abscission.

Q45. Water is conducted upward in plants by:

A Phloem

B **Xylem** ✓

C Cambium

D Epidermis

Explanation: Xylem carries water and minerals from roots to leaves, while phloem carries food.

Q46. Stomatal opening is mainly caused by the movement of which ion into guard cells?

A. Na+

B. Ca2+

C. **K+** ✓

D. Cl- only

Explanation: K+ ions enter guard cells, water follows by osmosis, the guard cells become turgid and the stoma opens.

Q47. The first stable product of the Calvin cycle is:

A. Oxaloacetic acid

B. **3-phosphoglyceric acid** ✓

C. Glucose

D. Pyruvate

Explanation: RuBisCO fixes CO2 onto RuBP, giving two molecules of 3-phosphoglyceric acid (3-PGA).

Q48. Which of these is a C4 plant?

A. Wheat

B. Rice

C. **Maize** ✓

D. Potato

Explanation: Maize, sugarcane and sorghum are C4 plants. They show Kranz anatomy and have little photorespiration.

Q49. Which bacterium fixes nitrogen in root nodules of legumes?

A. **Rhizobium** ✓

B. Nitrosomonas

C. Escherichia

D. Bacillus

Explanation: Rhizobium lives in root nodules and converts atmospheric nitrogen into ammonia.

Q50. Double fertilization is characteristic of:

A Gymnosperms

B Bryophytes

C Pteridophytes

D **Angiosperms** ✓

Explanation: In angiosperms one sperm fuses with the egg and the other with the polar nuclei to form endosperm.

6 Ecology, Evolution and Microbiology

Q51. The pioneer species in a primary succession on bare rock is:

A Mosses

B **Lichens** ✓

C Grasses

D Shrubs

Explanation: Lichens grow on bare rock and help in soil formation, so they are the pioneers in a lithosere.

Q52. Which group of chemicals mainly causes ozone depletion?

A. **CFCs** ✓

B. CO2

C. Methane

D. Sulphur dioxide

Explanation: Chlorofluorocarbons release chlorine atoms in the stratosphere that break down ozone.

Q53. The 10 percent law of energy transfer was given by:

A. Odum

B. **Lindeman** ✓

C. Tansley

D. Haeckel

Explanation: Raymond Lindeman proposed that only about 10 percent of energy passes from one trophic level to the next.

Q54. The term 'ecology' was coined by:

A. **Ernst Haeckel** ✓

B. Eugene Odum

C. A. G. Tansley

D. Charles Elton

Explanation: Ernst Haeckel introduced the term 'oekologie' in 1866.

Q55. Darwin's finches, which supported his theory of natural selection, were found in:

A Hawaii

B Madagascar

C **Galapagos Islands** ✓

D Australia

Explanation: Darwin observed variation in beak shape among finches in the Galapagos Islands, linked to different food sources.

Q56. Which pair is an example of homologous organs?

A. Wings of a bird and wings of a butterfly

B. **Forelimbs of a human and a whale** ✓

C. Eyes of an octopus and a human

D. Thorns and tendrils only

Explanation: Homologous organs have the same basic structure but may have different functions, showing a common ancestor.

Q57. The Hardy-Weinberg equation is:

A. $p + q = 2$

B. **$p^2 + 2pq + q^2 = 1$** ✓

C. $p \times q = 1$

D. $p^2 - q^2 = 0$

Explanation: In a population at genetic equilibrium, genotype frequencies are $p^2 + 2pq + q^2 = 1$.

Q58. The causative agent of malaria is:

- **A** **Plasmodium** ✓
- **B** Entamoeba
- **C** Trypanosoma
- **D** Giardia

Explanation: Malaria is caused by the protozoan Plasmodium, transmitted by the female Anopheles mosquito.

Q59. Penicillin was discovered by:

- **A** Louis Pasteur
- **B** Robert Koch
- **C** **Alexander Fleming** ✓
- **D** Edward Jenner

Explanation: Alexander Fleming discovered penicillin in 1928 from the mould Penicillium notatum.

Q60. The enzyme reverse transcriptase is found in:

A Bacteriophages

B **Retroviruses such as HIV** ✓

C Plant cells

D Mitochondria only

Explanation: Retroviruses use reverse transcriptase to make DNA from their RNA genome.

Quick Answer Key

1. B	2. A	3. C	4. B	5. C
6. B	7. C	8. C	9. B	10. B
11. C	12. B	13. C	14. B	15. B
16. C	17. D	18. A	19. B	20. C
21. B	22. C	23. B	24. C	25. B
26. D	27. B	28. C	29. B	30. B
31. C	32. B	33. B	34. D	35. B
36. A	37. C	38. B	39. B	40. C
41. B	42. C	43. A	44. C	45. B
46. C	47. B	48. C	49. A	50. D
51. B	52. A	53. B	54. A	55. C
56. B	57. B	58. A	59. C	60. B

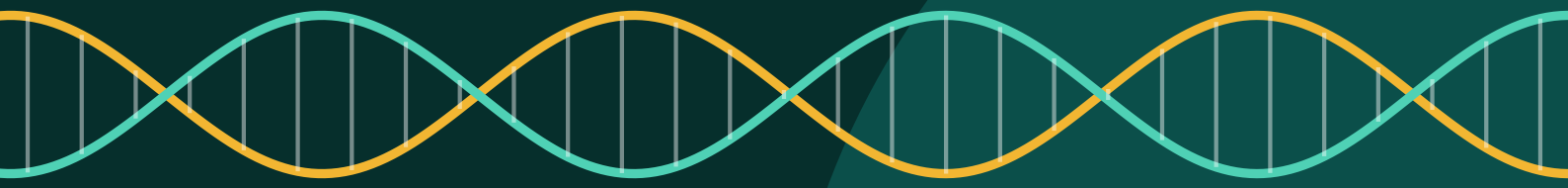


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