Harvard Undergraduate Science Olympiad India
2026 Final Round
7-8th Grade
Biology Section: Exam

Instructions:

- This test is one hour long and has 50 questions.
- Each question has five answer choices and each question has exactly one correct selection
- Each question is worth 1 point.
- The tiebreaker is the sum of the scores on questions 7, 18, 30, and 39.
- Don’t spend too much time on any single question.

Best of luck! You’ve got this!

Question 1: Which of the following biological macromolecules is responsible for the storage of genetic information?

A) Proteins
B) Nucleic Acids
C) Lipids
D) Carbohydrates
E) Oligosaccharides

Ans: B

Question 2: Which organelle is *primarily* responsible for producing ATP during cellular respiration?

A) Lysosome
B) Nucleus
C) Ribosome
D) Golgi Apparatus
E) Mitochondrion

Ans: E

Question 3: Which gas is released as a byproduct of photosynthesis?

A) Carbon Dioxide
B) Diatomic Oxygen
C) Diatomic Nitrogen
D) Diatomic Hydrogen
E) Methane

Ans: B

Question 4: Enzymes speed up chemical reactions by:

A) Increasing concentrations of reactants to increase reaction rates
B) Adding energy to reactants to overcome activation energy
C) Lowering the energy of products in order to make reactions spontaneous
D) Lowering activation energy
E) Increasing temperature

Ans: D

Question 5: Which nitrogenous base is found only in RNA?

A) Uracil
B) Adenine
C) Thymine
D) Guanine
E) Cytosine

Ans: A

Question 6: Gregor Mendel studied inheritance patterns using which of the following model organisms?

A) Fruit Flies
B) Arabidopsis Thaliana
C) Pea plants
D) Mice
E) E. coli

Ans: C

Question 7: Thomas Hunt Morgan studied inheritance patterns using which of the following model organisms?

A) Fruit Flies
B) Arabidopsis Thaliana
C) Pea plants
D) Mice
E) E. coli

Ans: A

Question 8: The observable traits of an organism are called its:

A) Genotype
B) Alleles
C) Genome
D) Phenotype
E) Inheritance

Ans: D

Question 9: Which type of symbiotic relationship benefits both organisms?

A) Parasitism
B) Mutualism
C) Commensalism
D) Amensalism
E) Synnecrosis

Ans: B

Question 10: Which of the following statements most accurately describes how water moves during osmosis?

A) Against the solute concentration gradient (from lower to higher solute concentration)
B) Along the solute concentration gradient (from higher to lower solute concentration)

C) Along water potential (from higher to lower water potential)
D) Both B and C
E) Both A and C

Ans: E

Question 11: Which level of ecological organization includes all the different populations in an area?

A) Organism
B) Population
C) Community
D) Ecosystem
E) Biome

Ans: C

Question 12: Which structure controls what gases enter and leave the leaf?

A) Root hairs
B) Apical Meristem
C) Vascular cambium
D) Stomata
E) Pedicels

Ans: D

Question 13: An animal cell placed in a hypertonic solution will most likely

A) Gain water and swell
B) Lose water and shrink
C) Experience no net water movement
D) Imbibe water and become turgid
E) A and D

Ans: B

Question 14: Which process directly results in genetic variation among offspring?

A) DNA Replication
B) DNA Repair
C) Mitosis
D) Binary Fission
E) Meiosis

Ans: E

Question 15: Which factor typically directly limits *primary* productivity in a *deep* ocean ecosystem?

A) Temperature
B) Salinity
C) Nutrient Cycling
D) Light Availability
E) Pressure

Ans: D

Question 16: Which structure allows efficient gas exchange in mammalian lungs?

A) Parabronchi
B) Bronchi
C) Alveoli
D) Stomata
E) Trachea

Ans: C

Question 17: A point mutation could not produce which of the following results?

A) Missense mutation
B) Nonsense mutation
C) Silent mutation
D) Frameshift mutation
E) Chromosomal inversion

Ans: E

Question 18: Which property of phospholipids causes biological membranes to form bilayers?

A) Covalent bonding patterns
B) Charge-charge interactions
C) Salt bridge formation with proteins
D) Low molecular weight
E) Amphipathic nature

Ans: E

Question 19: Which of the following factors would most likely increase transpiration rates in terrestrial plants?

A) Low temperature and high humidity
B) Low temperature and low humidity
C) High temperature and high humidity
D) High temperature and low humidity
E) Both A and D

Ans: D

Question 20: Which cellular structure is responsible for modifying, sorting, and packaging proteins for transport?

A) Endoplasmic Reticulum
B) Ribosome
C) Golgi Apparatus
D) Lysosome
E) Nucleus

Ans: C

Question 21: Which process converts the energy stored in photons into energy stored in chemical bonds?

A) Cellular respiration
B) Fermentation
C) Transpiration
D) Diffusion
E) Photosynthesis

Ans: E

Question 22: Which organelle contains digestive enzymes that break down cellular waste?

A) Vacuole
B) Mitochondrion
C) Peroxisome
D) Lysosome
E) Ribosome

Ans: D

Question 23: Which blood vessel type carries blood away from the heart?

A) Veins
B) Arteries
C) Capillaries
D) Anastomoses
E) Alveoli

Ans: B

Question 24: Which type of mutation does **NOT** change the amino acid sequence?

A) Missense
B) Nonsense
C) Silent
D) Frameshift
E) Insertion

Ans: C

Question 25: Which part of the brain controls balance and coordination?

A) Cerebrum
B) Hypothalamus
C) Medulla
D) Cerebellum
E) Pons

Ans: D

Question 26: Which structure connects muscles to bones?

A) Ligament
B) Cartilage
C) Tendon
D) Synovial fluid
E) Marrow

Ans: C

Question 27: Which of the following is the lowest level of biological organization that includes both biotic and abiotic factors?

A) Population
B) Community
C) Ecosystem
D) Biome
E) Biosphere

Ans: C

Question 28: Which nitrogenous base pairs with adenine in RNA?

A) Uracil
B) Cytosine
C) Guanine
D) Thymine
E) Inosine

Ans: A

Question 29: Which organ is primarily responsible for detoxifying blood?

A) Bone marrow
B) Liver
C) Heart
D) Lung

E) Pancreas

Ans: B

Question 30: You place a celery stalk in the fridge and return a few days later to see it has wilted and become floppy. The function of which organelle has been disrupted?

A) Chloroplast
B) Central vacuole
C) Cell wall
D) Plasmodesmata
E) Mitochondrion

Ans: B

Question 31: Which molecule is the final electron acceptor in aerobic respiration?

A) Carbon dioxide
B) Glucose
C) Oxygen
D) NAD^+
E) Water

Ans: C

Question 32: Which population growth pattern occurs when resources are unlimited?

A) Logistic growth
B) Linear growth
C) Stable growth
D) Exponential growth
E) Declining growth

Ans: D

Question 33: Which structure carries oxygenated blood from the lungs to the heart?

A) Pulmonary vein
B) Pulmonary artery
C) Aorta
D) Vena cava
E) Capillary

Ans: A

Question 34: Which part of the flower produces pollen?

A) Stigma
B) Ovary
C) Carpel

D) Filament
E) Anther

Ans: E

Question 35: Which macromolecule provides long-term energy storage?

A) Proteins
B) Carbohydrates
C) Polysaccharides
D) Nucleic acids
E) Lipids

Ans: E

Question 36: Which plant tissue transports sugars?

A) Xylem
B) Phloem
C) Cambium
D) Cortex
E) Epidermis

Ans: B

Question 37: A plant stem is flexible when young but provides structural support without becoming rigid. The cells in this tissue are living at maturity and have unevenly thickened primary cell walls rich in cellulose and pectin. Which tissue is being described?

A) Xylem
B) Sclerenchyma
C) Parenchyma
D) Collenchyma
E) Cambium

Ans: D

Question 38: Which structure in plants most directly uses the cohesion-tension mechanism of water?

A) Stomata
B) Xylem vessels
C) Phloem sieve tubes
D) Root hairs
E) Cambium

Ans: B

Question 39: Which process directly increases genetic variation without changing gene frequency?

A) Natural selection
B) Mutation
C) Genetic drift
D) Recombination
E) Gene flow

Ans: D

Question 40: Which cellular structure allows direct cytoplasmic connections between adjacent plant cells?

A) Middle lamella
B) Plasmodesmata
C) Cell wall
D) Tonoplast
E) Phragmoplast

Ans: B

Question 41: Which component of a nucleotide determines whether it is part of DNA or RNA?

A) Phosphate group
B) Nitrogenous base only
C) Sugar molecule
D) Hydrogen bonds
E) Covalent bonds

Ans: C

Question 42: Which tissue would be most abundant in the fleshy part of a fruit?

A) Parenchyma
B) Collenchyma
C) Sclerenchyma
D) Xylem
E) Phloem

Ans: A

Question 43: Which process occurs during the S phase of the cell cycle?

A) Protein synthesis
B) DNA replication
C) Chromosome separation
D) Cytokinesis
E) Spindle formation

Ans: B

Question 44: Which molecule is directly produced during the light-dependent reactions of photosynthesis?

A) ATP
B) Glucose
C) Carbon dioxide
D) Calvin cycle enzymes
E) Starch

Ans: A

Question 45: Which structure attaches chromosomes to spindle fibers?

A) Centromere
B) Kinetochore
C) Telomere
D) Chromatin
E) Nucleolus

Ans: B

Question 46: During which phase of mitosis do chromosomes align at the cell's equatorial plane?

A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
E) Cytokinesis

Ans: B

Question 47: Which ecological principle states that no two species can occupy the same niche indefinitely?

A) Resource partitioning
B) Competitive exclusion principle
C) Character displacement
D) Mutualism
E) Succession

Ans: B

Question 48: Which structure regulates the movement of substances into and out of the nucleus?

A) Nuclear pore complex (NPC)
B) Nuclear lamin proteins

C) Chromatin
D) Nucleolus
E) Rough ER

Ans: A

Question 49: Which type of selection favors individuals at both extremes of a trait distribution?

A) Directional selection
B) Disruptive selection
C) Stabilizing selection
D) Artificial selection
E) Sexual selection

Ans: C

Question 50: Which plant hormone is most closely associated with cell elongation?

A) Ethylene
B) Abscisic acid
C) Gibberellin
D) Cytokinin
E) Auxin

Ans: E