BRAINIACS OLYMPIAD

GRADES 9-10

BIOLOGY SAMPLE PAPER

THEORETICAL PART

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info@brainiacsolympiad.com www.brainiacsolympiad.com

BIOLOGY SAMPLE PAPER-GLOBAL FINAL
Grades: 9-10
Time: 120 minutes
Total points: 100

Question 1

Genetic information in organisms is stored in molecules that control inheritance.

Indicate which of the following statements are true or false.

A. DNA molecules contain genetic instructions used to build proteins.
B. Genes are specific segments of DNA located on chromosomes.
C. RNA molecules always remain inside the nucleus of the cell.
D. Chromosomes contain many different genes.

Answer
A. True
B. True
C. False
D. True

Question 2

During reproduction, organisms pass genetic information to their offspring.

Indicate which of the following statements are true or false.

A. Each parent contributes genetic information to the offspring.
B. Offspring always inherit identical traits from both parents.
C. Genes influence observable characteristics of organisms.
D. Different combinations of alleles can produce variation in traits.

Answer
A. True
B. False
C. True
D. True

Question 3

Blood circulates through the body carrying important substances.

Indicate which of the following statements are true or false.

A. Plasma helps transport nutrients and hormones through the blood.
B. White blood cells play a role in defending the body against infection.
C. Red blood cells help produce digestive enzymes in the stomach.
D. Platelets are involved in blood clotting.

Answer
A. True
B. True
C. False
D. True

Question 4

Plants depend on internal transport systems to move substances throughout their tissues.

Indicate which of the following statements are true or false.

A. Water absorbed by roots moves upward through plant tissues.
B. Sugars produced in leaves can be transported to other parts of the plant.
C. Plants transport nutrients only downward from the leaves.
D. Internal transport helps plants grow and maintain their structure.

Answer
A. True
B. True
C. False
D. True

Question 5

Population size in ecosystems changes depending on several biological factors.

Indicate which of the following statements are true or false.

A. Birth rate and death rate influence population size.
B. Limited food resources can restrict population growth.
C. Populations can increase indefinitely without environmental limits.
D. Environmental conditions can affect how large a population becomes.

Answer
A. True
B. True
C. False
D. True

Question 6

Genes determine inherited characteristics in organisms.

Indicate which of the following statements are true or false.

A. Genes are located on chromosomes inside cells.
B. Different forms of the same gene are called alleles.
C. Every individual receives all of its genes from only one parent.
D. Genetic variation can occur when different alleles combine in offspring.

Answer
A. True
B. True
C. False
D. True

Question 7

Cells require oxygen and nutrients to release energy.

Indicate which of the following statements are true or false.

A. Oxygen is used by cells during cellular respiration.
B. Carbon dioxide is produced as a waste product of respiration.
C. Energy released during respiration is stored in molecules such as ATP.
D. Cellular respiration occurs only in the lungs.

Answer
A. True

B. True
C. True
D. False

Question 8

Microorganisms play important roles in both health and disease.

Indicate which of the following statements are true or false.

A. Some bacteria are beneficial and help break down organic matter.
B. All microorganisms cause disease in humans.
C. Proper hygiene can reduce the spread of harmful microorganisms.
D. Microorganisms can be found in soil, water, and air.

Answer
A. True
B. False
C. True
D. True

Question 9

Water movement in plants is important for survival and growth.

Indicate which of the following statements are true or false.

A. Roots absorb water and mineral nutrients from the soil.
B. Water helps transport dissolved minerals within plants.
C. Plants require water for photosynthesis.
D. Water movement in plants occurs only inside leaves.

Answer
A. True
B. True
C. True
D. False

Question 10

Ecosystems contain many interacting populations of organisms.

Indicate which of the following statements are true or false.

A. Population size can change over time.
B. Food availability can influence population growth.
C. Predators have no effect on prey populations.
D. Interactions between species influence ecosystem balance.

Answer
A. True
B. True
C. False
D. True

Question 11

A genetic trait is controlled by a dominant allele (A) and a recessive allele (a).

Indicate which of the following statements are true or false.

A. An organism with genotype Aa shows the dominant trait.
B. An organism with genotype aa expresses the recessive trait.
C. An organism with genotype AA expresses the recessive trait.
D. Dominant alleles can mask the expression of recessive alleles.

Answer
A. True
B. True
C. False
D. True

Question 12

The heart works with blood vessels to circulate substances throughout the body.

Indicate which of the following statements are true or false.

A. Arteries carry blood away from the heart.
B. Veins carry blood toward the heart.

C. Capillaries allow exchange of substances between blood and tissues.
D. Blood circulation occurs only in the lungs.

Answer
A. True
B. True
C. True
D. False

Question 13

Microorganisms reproduce rapidly and can adapt to changing environments.

Indicate which of the following statements are true or false.

A. Bacteria reproduce mainly through cell division.
B. Genetic variation in bacteria can occur through mutations.
C. All bacteria reproduce through sexual reproduction.
D. Environmental conditions can influence bacterial population growth.

Answer
A. True
B. True
C. False
D. True

Question 14

Water movement inside plants is essential for growth and survival.

Indicate which of the following statements are true or false.

A. Water absorbed by roots can move upward through plant tissues.
B. Mineral nutrients are often transported in water within plants.
C. Plants can survive normally without transporting water internally.
D. Internal water transport helps supply cells with needed substances.

Answer
A. True

B. True
C. False
D. True

Question 15

Changes in environmental conditions can influence the size of populations.

Indicate which of the following statements are true or false.

A. Food shortages may decrease population size.
B. Increased disease can reduce population numbers.
C. Population size never changes once it is established.
D. Environmental changes can alter population growth patterns.

Answer
A. True
B. True
C. False
D. True

Question 16. Inheritance Analysis

In pea plants, purple flowers (P) are dominant over white flowers (p). Two heterozygous plants are crossed.

1. Construct a Punnett square for the cross.
2. Determine the genotype ratio of the offspring.
3. Determine the phenotype ratio of the offspring.
4. Explain why the observed results in a small sample may differ from the predicted ratio.

Question 17. Respiratory and Circulatory Stress Scenario

A student runs continuously for ten minutes and begins breathing heavily.

Explain step by step:

1. Why the body needs more oxygen during exercise.
2. How the breathing rate changes and why.
3. How the heart responds during exercise.
4. What may happen if oxygen supply does not meet the body's demand.

Question 18. Microorganisms in Daily Life

Explain:

1. Two beneficial roles of microorganisms in everyday life.
2. Two harmful effects microorganisms can have on humans.
3. Why handwashing and clean water reduce the spread of disease.
4. Why viruses and bacteria are not treated in exactly the same way.

Question 19. Plant Transport Investigation

A student wants to test whether wind speed affects water loss in plants.

Design a full investigation. Include:

1. A clear hypothesis.
2. The independent variable.
3. The dependent variable.
4. At least three controlled variables.
5. A step-by-step method.
6. The expected results and a biological explanation.

Question 20. Ecosystem Change Scenario

In a forest ecosystem, a disease causes a sharp decline in the rabbit population.

Predict and explain:

1. What may happen to the grass population.
2. What may happen to predators that feed on rabbits.
3. How this change may affect overall ecosystem balance.
4. One possible long-term outcome if the rabbit population remains low.

Question 16 – Inheritance Analysis (8 pts)

Component	Expected Elements	Points
Punnett square	Correct cross (Pp × Pp)	2
Genotype ratio	1 PP : 2 Pp : 1 pp	2
Phenotype ratio	3 dominant : 1 recessive	2
Probability explanation	Ratios reflect probability in large populations	2

Question 17 – Exercise Physiology (8 pts)

Component	Expected Elements	Points
Oxygen demand	Muscles need more oxygen for respiration	2
Breathing response	Increased breathing rate to supply oxygen	2
Heart response	Increased heart rate to transport oxygen	2
Consequence of oxygen shortage	Fatigue, lactic acid buildup	2

Question 18 – Microorganisms in Daily Life (8 pts)

Component	Expected Elements	Points
Beneficial roles	e.g., food production, decomposition	2
Harmful roles	diseases, food spoilage	2
Hygiene explanation	reduces pathogen transmission	2
Virus vs bacteria treatment	antibiotics target bacteria only	2

Question 19 – Plant Transport Investigation (8 pts)

Component	Expected Elements	Points
Hypothesis	Wind increases transpiration	1
Variables	independent (wind speed), dependent (water loss)	2
Controlled variables	plant type, light, temperature	2
Experimental method	controlled fan experiment measuring water loss	2
Expected result explanation	increased wind removes moist air → higher transpiration	1

Question 20 – Ecosystem Change Scenario (8 pts)

Component	Expected Elements	Points
Plant effect	grass increases without rabbits	2
Predator effect	predator populations decrease	2
Ecosystem balance	food web disturbance	2
Long-term outcome	ecosystem adjusts to new equilibrium	2