

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA  
RUDN UNIVERSITY  
Tests for RUDN University Open Olympiad for Foreign Citizens  
BIOLOGY (M)  
Variant 1

**A.1. The plant cell wall is made up of:**

1. phospholipids and pectin substances;
2. starch and pectin substances;
3. phospholipids and proteins;
4. cellulose and pectin substances.

**A.2. What is the process of emergence of plant organ germs (roots, shoots) in a growing callus mass called?**

1. phylogenesis;
2. pathogenesis;
3. organogenesis;
4. gametogenesis.

**A.3. Biotechnology is:**

1. using artificially synthesized substances and chemical processes to produce valuable products;
2. using living organisms and physical processes to produce valuable products;
3. using living organisms and biological processes to produce valuable products;
4. testing new dosage forms of drugs on laboratory animals.

**A.4. They make soil nitrogen compounds available to the root systems of higher plants:**

1. burrowing animals;
2. soil nematodes;
3. soil microorganisms;
4. earthworms.

**A.5. The structure of proteins has:**

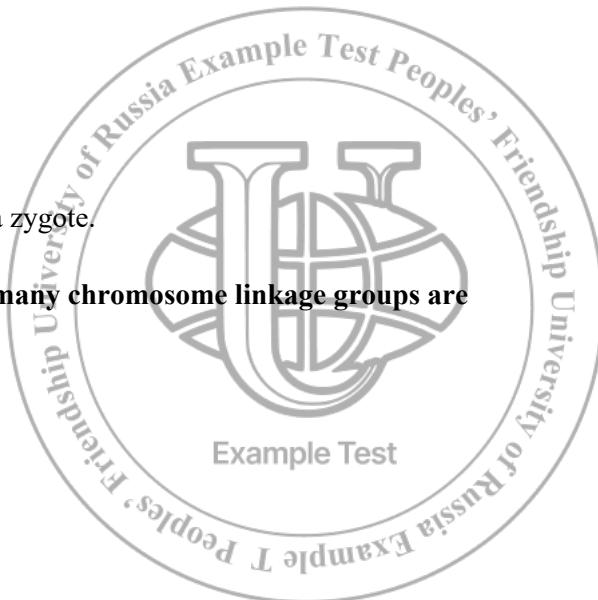
1. one level of molecular organization;
2. two levels of molecular organization;
3. three levels of molecular organization;
4. four levels of molecular organization.

**A.6. The epigamic type of sex in animals is determined...**

1. before fertilization of gametes;
2. instead of fertilization of gametes;
3. after fertilization of gametes;
4. at the moment of fusion of gametes and formation of a zygote.

**A.7. The number of chromosomes of the horse is 64. How many chromosome linkage groups are observed in this animal's karyotype?**

1. 32
2. 16



- 3. 128
- 4. 64

**A.8. What phenomenon is called inbreeding depression?**

- 1. decreased viability, yield, disease resistance under the influence of gene pairings in a heterozygous state;
- 2. increasing viability, productivity, disease resistance under the influence of gene pairing in a heterozygous state;
- 3. decreased viability and productivity compared to offspring obtained from unrelated crossing;
- 4. decreased viability as a result of an increase in the degree of homozygosity.

**A.9. Signs of an autosomal dominant type of inheritance of human and animal abnormalities will manifest themselves as follows (indicate the incorrect expression):**

- 1. The abnormality is passed on from generation to generation without gaps.
- 2. The abnormality can be observed in both sexes.
- 3. All abnormal offspring will be female.
- 4. All sons from abnormal fathers will be abnormal.

**B.1. Apomixis is the development of a plant embryo without fertilization. There are the following types of apomixis (choose three correct answers):**

- 1. Endosperm genesis - the embryo develops from triploid endosperm.
- 2. Apogamy - the embryo develops from synergids or antipodes.
- 3. Apospory - the embryo sac develops from the cells of the ovule, nucellus or integuments.
- 4. Parthenogenesis - the embryo develops from haploid or diploid unfertilized eggs.
- 5. Amphimixis - typical sexual reproduction associated with pairwise fusion of gametes, plasmogamy and subsequent karyogamy.

**B.2. What is mycorrhiza and what is its role in plant life?**

- 1. microorganisms on and around the plant roots which consume and reduce the toxicity of the root exudate;
- 2. The totality of different types of microorganisms inhabiting the soil habitat is called microflora.
- 3. symbiotic association of fungal mycelium with the roots of higher plants increasing the absorption capacity and volume of substances absorbed from the soil;
- 4. root exudate in the root zone increasing the solubility of minerals;
- 5. root zone rich in microorganisms which mineralize organic matter and dissolve soil minerals. – rhizosphere;
- 6. group of fungi which feed on the nutrients of other living organisms.

**B.3. Indicate the processes related to energy metabolism. Choose three correct answers.**

- 1) glucose synthesis;
- 2) release of oxygen into the atmosphere;
- 3) ATP synthesis;

- 4) oxidative phosphorylation;
- 5) glycolysis;
- 6) chemosynthesis.

**B.4. A woman with blood type A (II) has a child with blood type O (I). Both mother and child have a negative Rh factor (rh<sup>-</sup>rh<sup>-</sup>).**

**What are the genotypes of the mother, her child, and what cannot be the genotype of the father? (choose three correct answers)**

1. The woman's genotype is AA, the child's genotype is OO, the father cannot have the A0 genotype and the Rh factor rh<sup>+</sup>rh<sup>+</sup>.
2. The woman's genotype is AA, the child's genotype is OO, the father cannot have the AB genotype and the Rh factor is rh<sup>+</sup>rh<sup>+</sup>.
3. The woman's genotype is A0, the child's genotype is OO, the father cannot have the AB genotype and the Rh factor is rh<sup>+</sup>rh<sup>+</sup>.
4. The woman's genotype is A0, the child's genotype is OO, the father cannot have the BB genotype and the Rh factor is rh<sup>+</sup>rh<sup>+</sup>.
5. The woman's genotype is AA, the child's genotype is OO, the father cannot have the AA genotype and the Rh factor is rh<sup>+</sup>rh<sup>+</sup>.
6. The woman's genotype is A0, the child's genotype is OO, the father cannot have the AA genotype and the Rh factor is rh<sup>+</sup>rh<sup>+</sup>.

### **C.1. Chemosynthesis is .....**

1. This is a method of formation of polymer molecules (proteins and nucleic acids), in which their structure is determined by the structure of the matrix (DNA or mRNA).
2. This is an autotrophic type of nutrition which is characteristic of some microorganisms (bacteria and archaea), which can create organic substances from inorganic ones.
3. This is the targeted production of complex chemical compounds from simpler substances (reagents) using chemical reactions and their combination with mechanical operations and physical activation.
4. This is the formation of complex organic substances necessary for the life of both plants and all other organisms from simple compounds (for example, carbon dioxide and water) by higher plants, algae, photosynthetic bacteria using the light energy absorbed by chlorophyll and other pigments.
5. This is an enzymatic process of anaerobic breakdown of glucose accompanied by the accumulation of energy stored in the form of adenosine triphosphate (ATP).

### **C.2. Fill in the missing biological terms in the text using the words from the list below the text.**

#### **Megasporogenesis in plants, formation of the embryo sac and egg.**

Megasporogenesis occurs in the female reproductive sphere - in \_\_\_\_\_. Morphologically, \_\_\_\_\_ is represented by a pistil (or pistils). A pistil includes: \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_. The ovary contains \_\_\_\_\_ (one or more). The internal contents of the ovule are \_\_\_\_\_. The cover of the ovule is formed by double or single \_\_\_\_\_. The nucellus of the ovule contains one \_\_\_\_\_ (2n) capable of dividing by meiosis (the archesporium is multicellular in some plants). As a result of \_\_\_\_\_, four \_\_\_\_\_ (n) are formed from the archesporial cell (mother cell of the megasporocytes). Soon three of them die, and one increases in size and divides through \_\_\_\_\_.

three times. As a result, an eight-nucleated \_\_\_\_\_ (female gametophyte) is formed. Three nuclei with the adjacent cytoplasm form antipodal cells, two nuclei - one central diploid nucleus; two nuclei - two cells - \_\_\_\_\_; one nucleus becomes \_\_\_\_\_.

**Words to insert into text:**

archesporial cell

haploid megaspores

gynoecium

ovary

embryo sac

integument

meiosis

mitosis

nucellus

stigma

ovule

synergid

style

nucleus of the egg.