

1	Give definition and describe the interactions relate to fundamental.	№1
2	List the fundamental interactions in ascending order of the relative intensity.	№1
3	Describe the gravitational waves and the possible sources of their nature.	№1
4	Explain in which physical phenomena is weak interactions occur.	№1
5	Describe weak interactions and explain why they are considered as short-action.	№1
6	Describe the values of the interaction energy which can be talked about merger of weak and electromagnetic interactions.	№1
7	Describe pions and gluons are two kinds of quanta in the strong interaction.	№1
8	Describe an importance of neutrinos on thermonuclear processes inside the Sun and stars.	№1
9	Describe the registration of neutrinos.	№1
10	Give definition and describe neutrino oscillations.	№1
11	Describe what changes have been the concept of "rest mass" and "relativistic mass" in recent developments in particle physics.	№1
12	Explain the meant of the terms "technology" and "quantum" sensitivity limits in the physical experiment.	№1
13	Explain "Colored" and "colorless" particles.	№1
14	Give definition and describe the cumulative particle.	№1
15	Explain the concept of "mass defect" and how they define the "valley of stability".	№1
16	Explain four groups which are divided presently known radioactive processes.	№2
17	Characterize the model of "liquid drop" which explains nuclear fission.	№2
18	Give definition and describe which nuclei characterized proton and double-proton radioactivity.	№2
19	Explain a cluster radioactivity.	№2
20	Explain beams of accelerated radioactive nuclei which are used to obtain and study of exotic isotopes.	№2
21	Specify the main features and characteristics of the interactions of charged particles.	№2
22	Specify the main features of the strong interaction.	№2
23	Describe the basic characteristics of the weak interaction.	№2
24	Describe the particles or field which creates interaction.	№2
25	Describe the particles that are elementary components of matter.	№2

26	Explain the meaning of quantum number "color" for quark.	Nº2
27	Describe the difference of "gluons" and quarks.	Nº2
28	Explain the meaning and describe Feynman diagrams.	Nº2
29	Give definition and describe Planck's constant.	Nº2
30	Explain the physical meaning of indeterminacy.	Nº2
31	Explain what an important role plays weak interaction in the formation of our Universe.	Nº3
32	Explain why do we need high-energy particle accelerators and why they can be used to understand the physics of the early Universe.	Nº3
33	Describe the Large Hadron Collider.	Nº3
34	Describe a cyclotron and the basic principles of its operation.	Nº3
35	Give definition and describe Yukawa potential and the Coulomb potential - describe their main characteristics and differences.	Nº3
36	Give definition and describe leptons. Give the types of leptons and their characteristics.	Nº3
37	Give definition and describe spins of elementary particles.	Nº3
38	Give definition and describe Pauli principle and structure of nuclei. Describe the construction of the electron orbits in atoms.	Nº3
39	Describe Fermi and Bose particles.	Nº3
40	Give examples of the properties of particles associated with quantum number "strangeness".	Nº3
41	Describe the binding energy of the nuclei.	Nº3
42	Explain how to determine the binding energy of the nucleus, knowing the mass of the nucleus, the mass of the proton and neutron.	Nº3
43	Find a specific energy of a nucleus of a helium atom.	Nº3
44	Determine the total binding energy of a nucleus of uranium-238.	Nº3
45	Determine the total specific binding energy of a nucleus of molybdenum-96.	Nº3
46	Determine the total binding energy of a nucleus of osmium -191.	Nº3
47	Describe the types of radioactivity of different nuclei.	Nº3
48	Describe the reaction of the alpha decay of nuclei.	Nº3
49	Describe the reaction of the beta decay of nuclei.	Nº3
50	Describe reaction of electron capture.	Nº3
51	Give definition and describe gamma and beta radiation of nuclei.	Nº3
52	Analyze the reaction of spontaneous fission of heavy nuclei. Describe the fission products.	Nº3

53	Explain principle of operation of nuclear reactors based on uranium fission.	Nº3
54	Describe fission chain reaction.	Nº3
55	Analyze the reaction of light nuclei. Write the fusion reaction of protons with form of deuterium nuclei.	Nº3
56	Give definition and describe burning the nuclei of hydrogen atoms on the Sun.	Nº3
57	Give definition and describe cycles of thermonuclear burning of hydrogen with form of helium nuclei.	Nº3
58	Explain what means "island of stability" for the nuclei of chemical elements.	Nº3
59	Characterize properties of nuclei far from island of stability. Give examples.	Nº3
60	Explain abundances of chemical elements in nature.	Nº3