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**SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS**

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**PRACTICUM ON THE TRAINING COURSE**  
**"LIFE SAFETY AND LABOUR PROTECTION"**

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P93

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Basic theoretical information, description of practical tasks and guidelines for doing them, material for consolidation of knowledge, basic typical tasks on the topics of the training course are provided.

For Bachelor's (first) degree students of speciality 073 "Management".

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# Introduction

The reverse side of scientific, technical, social, and economic progress is an increased risk of its negative impact on human life and the environment. That is why safety improvement is one of the most urgent tasks today. It is impossible to create absolute security. However, minimisation of the danger likelihood is a feasible but difficult task because it requires rethinking and reevaluation of the experience and knowledge of modern science, in other words, a radical change in the human worldview. New knowledge branches are designed to achieve this goal. They combine the diverse current and past human experience. One example of such a complex combination of knowledge is the training course "Life Safety and Labour Protection". The training course bases on the analysis and solution of human safety issues. Its content includes such elements as comprehensive study and classification of hazards which may affect humans, the sources of their occurrence, and means and measures aimed at the prevention and elimination of these hazards. The scientific base of the training course consists of the findings of modern research in physiology and psychology, ergonomics, ecology, etc., which provides systematic knowledge that the student receives.

*The training course aims* to study the general patterns of occurrence and development of dangers, analyse the nature and consequences of the impact of hazards on human health, and form necessary skills and abilities to prevent and eliminate risks.

*The training course tasks are:* identification of optimal parameters of human activity; study of the conditions of the hazard formation; forecasting the occurrence of danger; selection of methods for prevention and reduction of negative consequences of the hazards' impact on people.

*The training course subject* is human life activity.

# Theme 1. Basic concepts and principles of life safety and labour protection

## Practice 1

### Basic concepts of life safety and labour protection

*The competences* are: the ability to study the basic concepts of life safety; determining the essential safety issues.

#### 1.1. Theory

*Life safety and labour protection* is a system of basic knowledge of ensuring safe living conditions in natural, social and technogenic environments [2; 10].

*The environment* is an aggregate of objects of the surrounding world that influence human activity and satisfy diverse needs (personal, biological, cultural, economic, social, etc.) (Fig. 1.1).

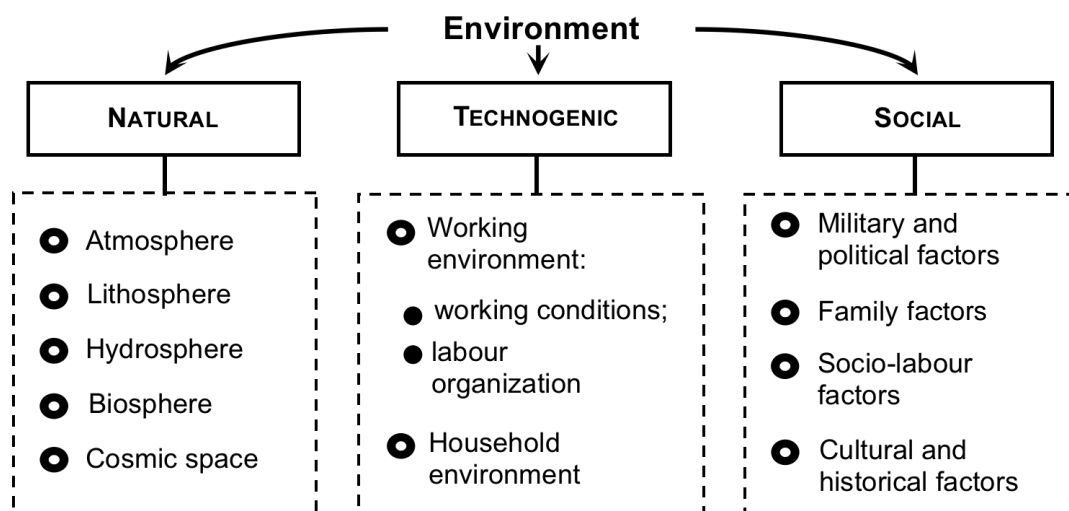


Fig. 1.1. Classification of the environment factors

*Life* is one of the forms of matter existence which differs from others in the ability for reproduction, growth, development, active regulation of its composition and functions, different ways of movement, adaptation to the environment, metabolism, and response to the stimuli [2; 10].

*Activity* is a specific form of action the content of which is a rational change and transformation of the environment in the interests of humans.

*Danger* is a phenomenon, object or process that can cause harm to human health directly or indirectly under certain conditions [10].

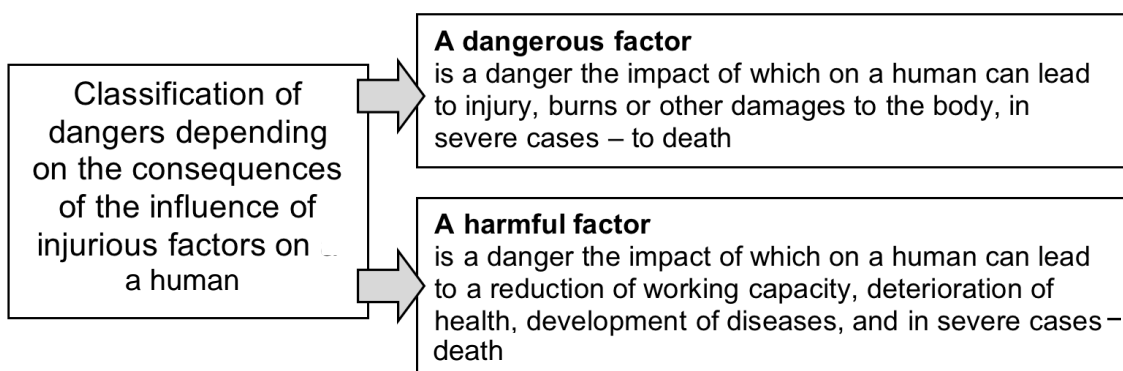
*Safety* is a balanced (according to experts) condition of humans, systems, society, state, etc. [10].

*Danger nomenclature* is a list of possible dangers.

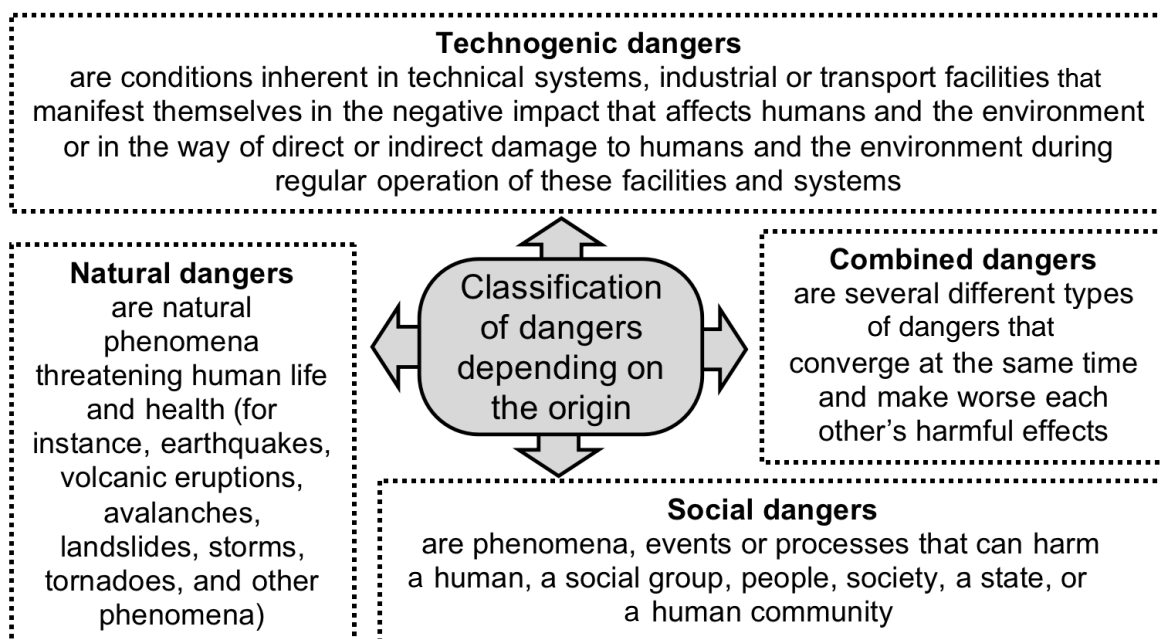
*Danger quantification* is the introduction of quantitative characteristics to assess the degree of danger.

*Danger identification* is determining a danger type, establishing the possible causes of its arising, spatial and temporal coordinates, the probability of manifestation and consequences of its realization to develop measures to remove or eliminate its effects.

*Danger taxonomy* is classification and systematisation of dangers depending on various features (Fig. 1.2 – 1.6) [2; 7; 9; 10].



**Fig. 1.2. Classification of dangers depending on the consequences of the influence of injurious factors on a human**



**Fig. 1.3. Classification of dangers depending on the origin**

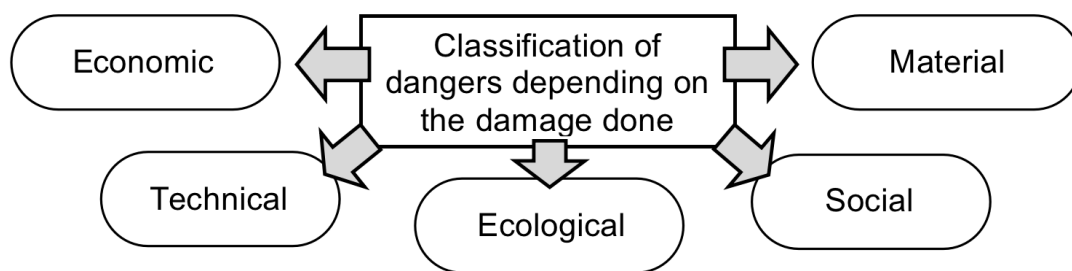


Fig. 1.4. **Classification of dangers depending on the damage done**

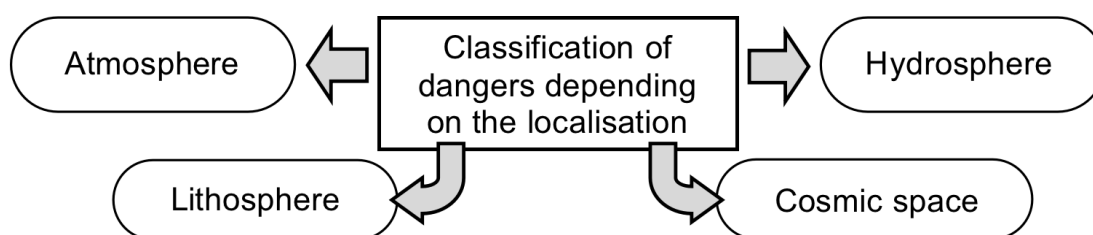


Fig. 1.5. **Classification of dangers depending on the localisation**

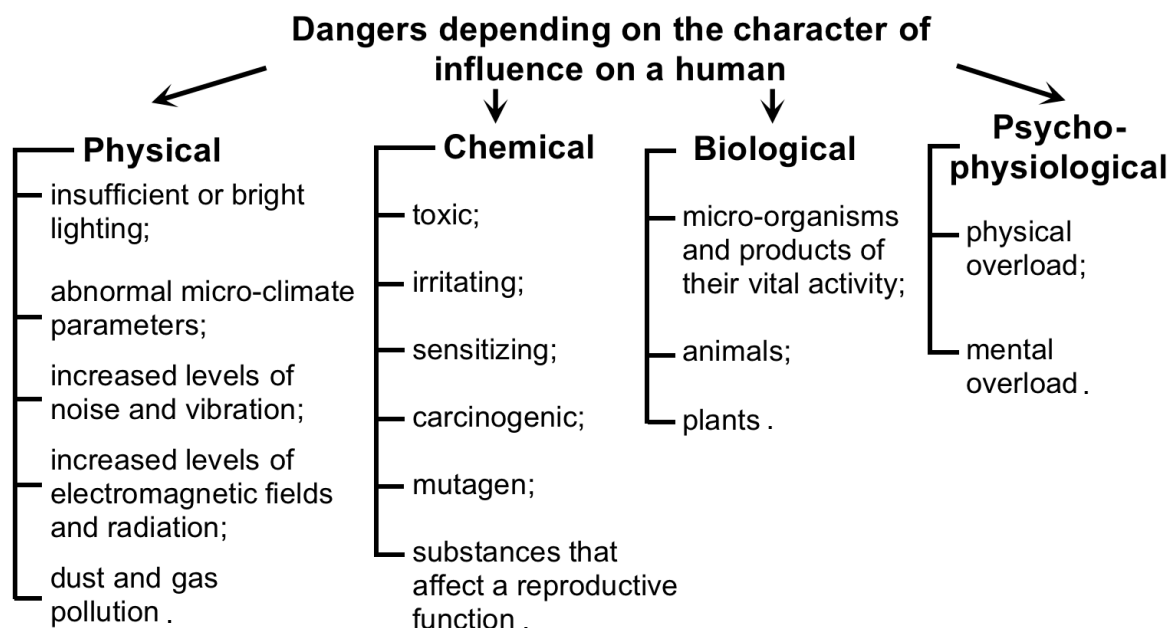
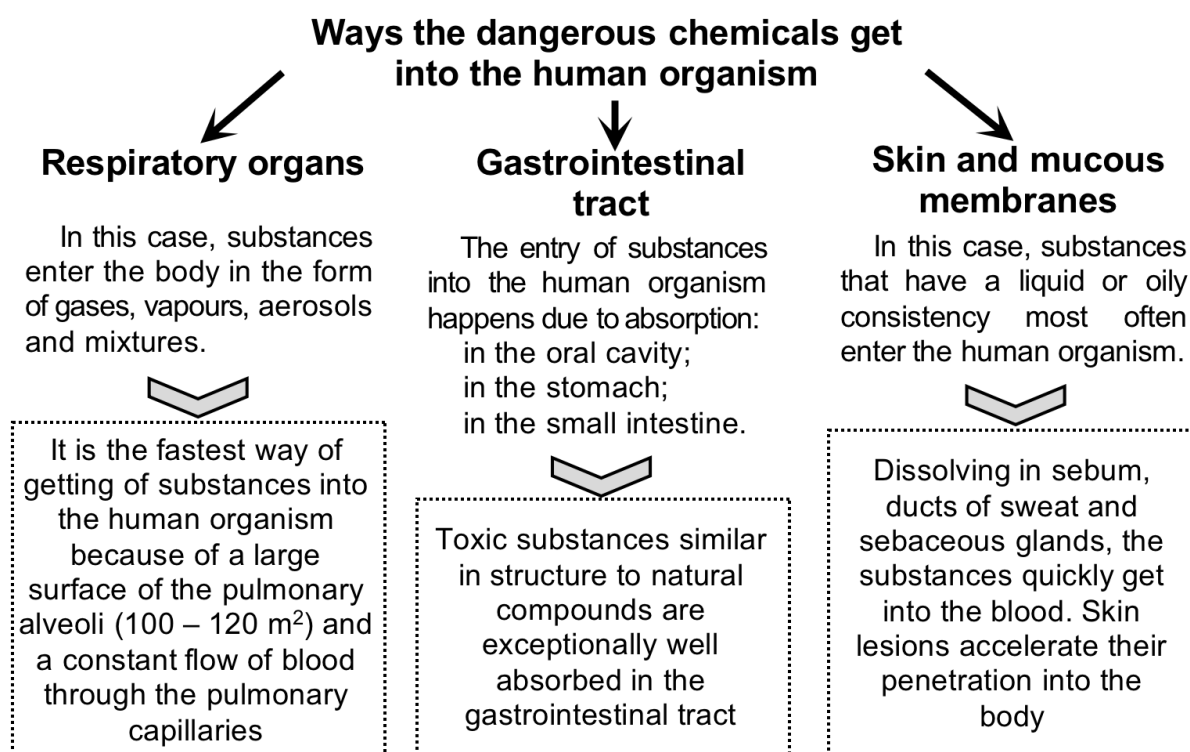


Fig. 1.6. **Classification of dangers depending on the character influence on a human**

*Dangerous chemicals* are substances of the different aggregate states that can cause any general or local, instantaneous or remote in time negative effect on the human organism (Fig. 1.7).



**Fig. 1.7. Ways the dangerous chemicals get into the human organism**

*Toxic substances* cause poisoning of the whole human organism or affect the condition of the individual organ and systems (for example, nervous system disorders and liver damage, etc.). These are carbon monoxide, lead, mercury, nitrate, etc.

*Carcinogenic substances* cause the development of tumours. These are nickel, asbestos, chromium and others.

*Mutagen substances* affect the reproductive cells, which leads to a violation of genetic information. These are lead, mercury salts and the like.

*Irritating substances* irritate the respiratory tract and mucous membranes. These are chlorine, ammonia, acetone and others.

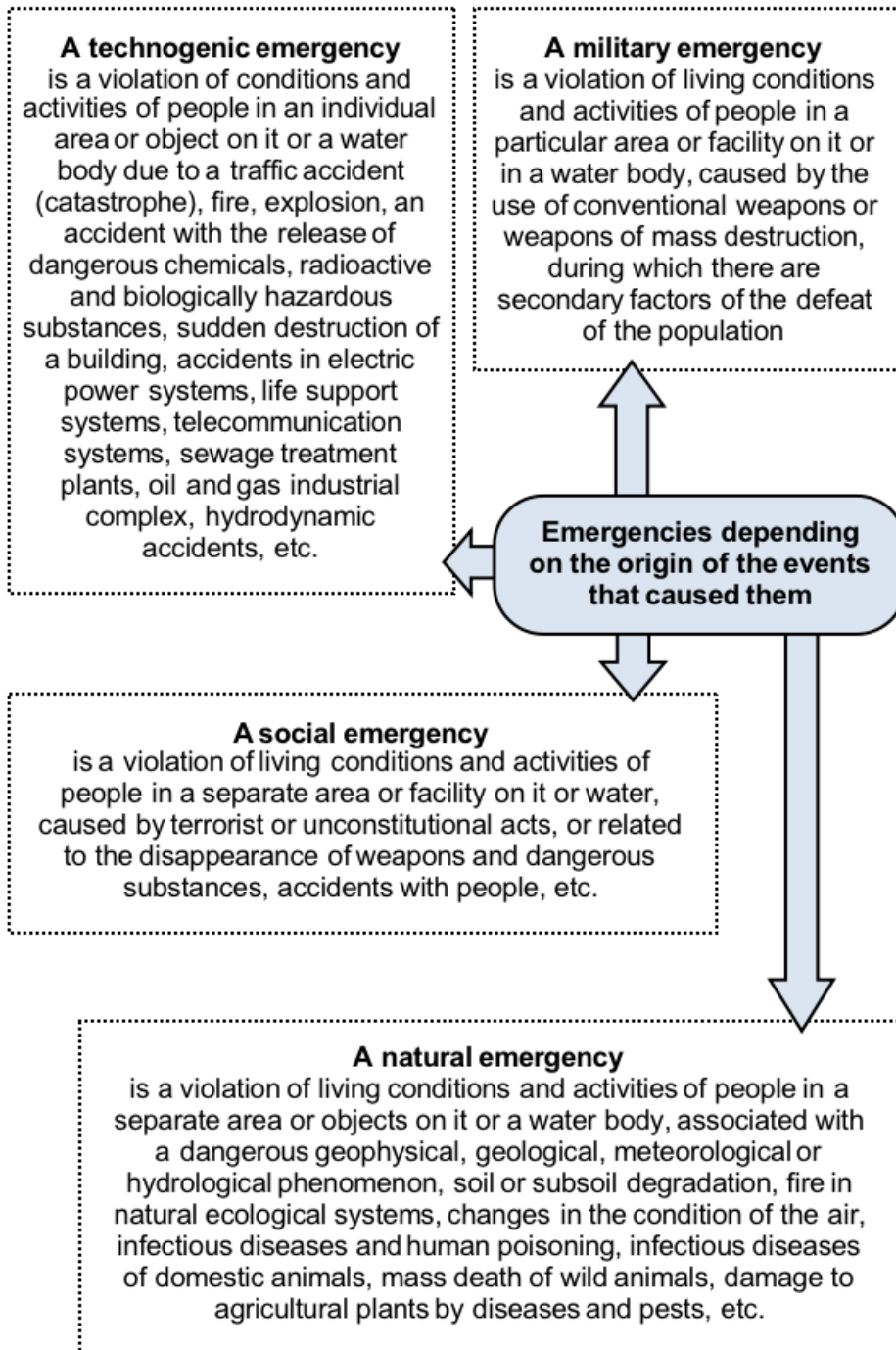
*Sensitizer substances* act as allergens. These are formaldehyde, antibiotics, solvents and the like.

*Substances that affect the reproductive function* contribute to congenital malformations. These are manganese, styrene, boric acid and others.

*An emergency* is a disturbance of the normal living conditions of people on an object or territory caused by an accident, catastrophe, natural disaster or other factors that lead to injury or death of people, animals and plants, significant material damage and harms the environment (Fig. 1.8 – 1.10) [7].

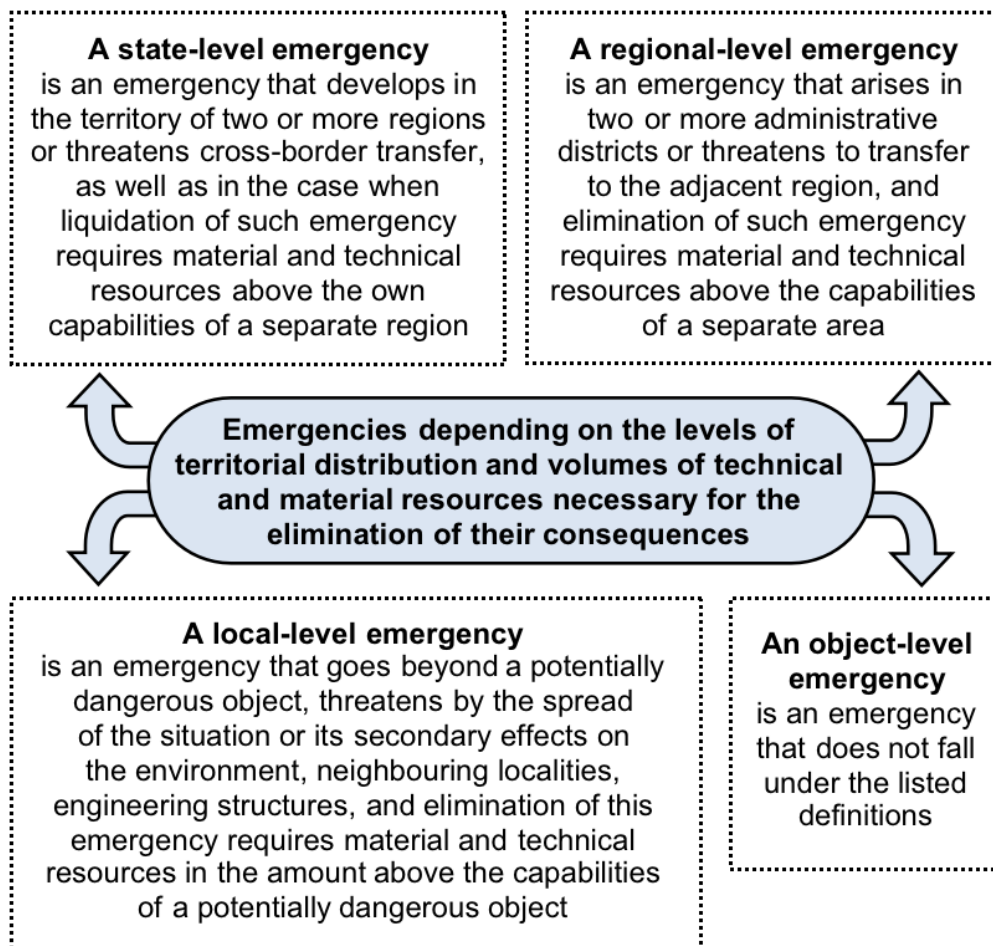
Global	National
Emergencies covering a large part of the continental surface of the Earth or the area of the world's ocean, where two or more states are located	Emergencies occurring in the territory of one state

**Fig. 1.8. Classification of emergencies depending on the level of world distribution**



**Fig. 1.9. Classification of emergencies depending on the origin of the events that caused them**





**Fig. 1.10. Classification of emergencies depending on the levels of territorial distribution and volumes of technical and material resources necessary for elimination of their consequences**

## 1.2. Practice

**Assignment 1.** Analyse the conditions of tasks, identify dangers, and classify them according to the origin and the character of influence on a human.

*Task 1.* For several years, such dangers as insufficient light, dusty air, toxic substances and infra-red electromagnetic radiation have negatively affected an employee. Besides, the employee often had mental overload due to the high level of responsibility for performing work. Identify dangers, and classify them according to the origin and the character of influence on a human.

*Task 2.* An employee lost consciousness during work. It happened due to prolonged exposure of him to abnormal micro-climate parameters and electromagnetic fields. After a few days, the employee's condition deteriorated. Clinical analyses showed that deterioration happened because of physical overload on the organism. Identify dangers, and classify them according to the origin and the character of influence on a human.

*Task 3.* High temperatures, humidity, and toxic substances are observed in a paint shop. The influence of these factors can harm employees. Besides, employees work with hand-held power tools, which leads to the negative impact of vibration on them. Identify dangers, and classify them according to the origin and the character of influence on a human.

*Task 4.* The commission inspected the condition of labour protection at an enterprise. It established that the micro-climate parameters and lighting in the working room do not meet the requirements of labour protection standards. Besides, the commission found that some mixtures contain pathogenic micro-organisms and carcinogenic substances. Identify dangers, and classify them according to the origin and the character of influence on a human.

*Task 5.* For several years high humidity, electromagnetic radiation, dusty air, sensitizing substances, and mental overload have had an impact on the employees. As a result, the rate of employees' diseases has increased. Identify dangers, and classify them according to the origin and the character of influence on a human.

**Assignment 2.** Analyse the conditions of tasks, identify dangers, and classify them according to the origin of the events that caused them and levels of territorial distribution and volumes of technical and material resources necessary for elimination of their consequences.

*Task 1.* An emergency has arisen on the farm in Ivanivka village. The mass disease of cattle with anthrax has happened. Quarantine was introduced in the locality promptly, so the situation hasn't spread to neighbouring settlements. However, the threat of infection of the village residents with the virus remains. At the same time, living conditions have significantly deteriorated. The resources needed to eliminate the consequences of the emergency exceed the farm's capabilities. Classify the emergency according to the events that caused it, and the levels of territorial distribution and volumes of technical and material resources necessary for the elimination of its consequences.

*Task 2.* As a result of the accident at an enterprise, a significant amount of dangerous chemicals got into the atmosphere. The consequences of the emergency spread to the neighbouring region, 38 people were injured, the living conditions of 2,500 people worsened for a long time, and the resources needed to eliminate the consequences exceed the enterprise's capabilities. Classify the emergency according to the events that caused it, and the levels of territorial distribution and volumes of technical and material resources necessary for the elimination of its consequences.

*Task 3.* There was an explosion of an aviation fuel container at the airport. The emergency did not go beyond the airport and did not threaten other objects. However, one person received thermal burns and deep wounds. Classify the emergency according to the events that caused it, and the levels of territorial distribution and volumes of technical and material resources necessary for the elimination of its consequences.

*Task 4.* An emergency occurred at a uranium ore mining enterprise. A weapon of mass destruction was used. As a result, destruction of radioactive substance warehouses, transport and engineering communications happened. The resources needed to eliminate the consequences of the emergency exceeded the enterprise's capabilities. Classify the emergency according to the events that caused it, and the levels of territorial distribution and volumes of technical and material resources necessary for the elimination of its consequences.

*Task 5.* In the Shevchenkiv district of the Kharkiv region, an emergency occurred at a brick factory. The consequences of the emergency did not spread to the neighbouring area. The resources necessary to eliminate the consequences did not exceed the enterprise's capabilities. There were no dead or injured. The living conditions did not deteriorate. Classify the emergency according to the events that caused it, and the levels of territorial distribution and volumes of technical and material resources necessary for the elimination of its consequences.

### **The self-test questions**

1. Define the concept of danger.
2. Define the concept of emergency.
3. In what way can dangers be classified?
4. Give the classification of dangers according to their origin.
5. Give the classification of dangers according to the character of influence on a human.
6. Give the classification of emergencies according to the origin of the events that caused them.
7. Give the classification of emergencies according to the levels of territorial distribution and volumes of technical and material resources necessary for elimination of their consequences.

## **Theme 2. Physiological and psychological criteria of human safety**

### **Practice 2**

#### **Health and mechanisms supporting it**

*The competences* are: the ability to study the principles of human health preservation; training the essential principles of a healthy lifestyle.

#### **2.1. Theory**

*Valeology* is the science about the organism's genetic and physiological reserves that ensure the stability of physical, biological, psychological, and socio-cultural development and preservation of human health under the influence of external and internal factors that change permanently [8].

A human realizes reactions to the influence of external and internal factors due to physical and mental capabilities, an indicator of which is the health condition.

*Health* is human's physical, mental and social well-being rather than merely absence of disease or physical affliction [2; 8].

Health is a complex (multilevel) condition that requires comprehensive research. For a deeper understanding of the concept, let's consider the levels of health condition. There are two levels: individual health and social one.

*Individual health* is formed by society, the person's physiological and mental characteristics and lifestyle.

*Social health* is the health of the population in general.

Thus, health is the organism's ability to ensure the implementation of genetic programs, unconditional reflex processes, generative functions, mental activity and human phenotype behaviour. It allows humans to adapt to macro- and micro-environment and to be productive in the various aspects of life.

A *genotype* is a complex of all organism genes that determine hereditary properties [8].

The interaction of genotype and environmental conditions creates the organism phenotype.

A *phenotype* is a set of an organism's signs and properties forming in the process of its individual development [8].

Clinical indicators of an individual, such as height, body weight, eye colour, hair type, and blood type, are phenotypic.

*The following indicators characterise individual health:*

subjective: well-being, working capacity, sleep, appetite;

objective: anthropometric characteristics (body weight, height, chest circumference, neck, thighs, abdomen, etc.), respiratory rate, the vital capacity of the lungs, pulse, blood pressure and others.

*The following indicators characterise social health:*

demographic indicators: the number, composition, movement of the population both in the form of migration processes and natural (birth rate, mortality, natural population growth, average life expectancy, etc.);

indicators of physical population development;

indicators of morbidity, injuries and disability.

According to the current views, there are automatic mechanisms of self-organisation ensuring the formation, strengthening and maintenance of human health. The essential means of maintaining human health are homeostasis and adaptation.

*Homeostasis* is a hereditary ability of the human organism to maintain vital functions in various environmental conditions [11].

Homeostasis includes thermoregulation, blood composition constancy, the sugar level in the blood, osmotic pressure, etc. Human health is preserved if the organism's condition is stable or its violations are short-term. In the case of persistent disturbance of homeostasis, the organism uses another ability – *adaptation* [2; 10; 11].

*Adaptation* is an optimal life activity strategy developed by the organism for adapting to significantly changed environmental conditions [11].

The most beneficial organism's signs and properties form during the process of adaptation. The final result of the adaptation is the formation of a new homeostasis level, which ensures the organism's vital activity in a changing environment [2; 10; 11].

If the organism's adaptation goes beyond its capabilities, there is a risk of disease. It happens because the organism's capabilities do not meet the requirements of new environmental conditions.

There are several factors affecting human health (Table 2.1).

### Factors that affect human health

Group of factors	Type of effect on human health	
	Positive	Negative
Genetic	Healthy heredity, absence of disease prerequisites, etc.	Hereditary diseases, predisposition to diseases, etc.
Environmental conditions	Good domestic, industrial, natural, and ecological conditions	Bad domestic, industrial, natural, and ecological conditions
Health care	Monitoring of the population's health, preventive measures, comprehensive medical care	A lack of monitoring of the population's health, absence of preventive measures and comprehensive medical care
Lifestyle	A permanent place of residence, active lifestyle, social and psychological comfort, a complete and rational diet, absence of bad habits, etc.	Absence of a permanent place of residence, low physical activity, social and psychological discomfort, a poor diet, bad habits, etc.

The positive influence of each group of factors provides a human with significant potential for physical and mental working capacity that is the base of a full life.

One of the valeology concepts is *a healthy lifestyle*. Among the significant number of its definitions the most acceptable one is the following.

*A healthy lifestyle* corresponds to genetically determined human typological features and specific living conditions; it's focused on the health's formation, maintenance, strengthening, and performance of socio-biological functions by humans [8].

In this definition, the emphasis is on the individualisation of the concept itself; it means that healthy lifestyles should be equal to the number of people. This factor is essential because an effective system of a healthy lifestyle should take into account the following points:

typological features of a human (for example, type of the nervous system, mechanisms of vegetative nervous regulation, etc.);

age and gender;

the social situation in which a human lives (for example, family status, profession, working conditions, material security, etc.);

human life orientations.

## 2.2. Practice

**Assignment 1.** Assess the health condition with the help of L. Ryder's quiz. Determine the factors that negatively affect health.

Instruction. Read carefully the questions and suggested sets of possible answers. Choose one answer from the proposed list that best suits your opinion. Circle the number of this answer.

Attention! There are five parts. Each part has a separate key for interpreting the results, which is given below each part.

### Quiz

*Part 1.* Assess your health condition. Highlight your answer:

1 – very bad; 2 – bad; 3 – satisfactory; 4 – good; 5 – excellent.

*Key to part 1.* This part is self-assessment of health. Low self-assessment is usually associated with high levels of stress and low life satisfaction.

*Part 2.* Evaluate to what extent you agree with each of the following assertions (Table 2.2). Highlight your answers.

Table 2.2

### The list of assertions and their assessment

No.	Assertions	Agree	Rather agree	Rather disagree	Disagree
1	Most likely, I'm a nervous person	1	2	3	4
2	I am very worried about my work	1	2	3	4
3	I often feel nervous	1	2	3	4
4	My daily activity is very stressful	1	2	3	4
5	During communication with people, I often feel nervous	1	2	3	4
6	By the end of the day, I am completely exhausted physically and mentally	1	2	3	4
7	Tension often arises in my family	1	2	3	4

*Key to part 2.* Part 2 is a scale of psychosocial stress. When processing the data, you should calculate the sum of points on seven assertions. After that, divide the sum by 7. Then, deduct the obtained value from 4. The result is a stress indicator, which is in the range from 0 to 3 points. Depending on the stress indicator, you can be in a group with high, medium or low levels of psychosocial stress (Table 2.3).

Table 2.3

### The level of psychological stress

The stress level	Average score	
	Men	Women
High	2.00 – 3,00	2.18 – 3.00
Medium	1 – 1.99	1.18 – 2.1
Low	0.00 – 0.99	0.00 – 1.1

*Part 3.* Evaluate how you feel lately. Circle a suitable answer (Table 2.4).

Table 2.4

### The list of assertions and assessment

No.	Assertions	Agree	Rather agree	Rather disagree	Disagree
1	I am satisfied with the last life year	4	3	2	1
2	The mood got worse	4	3	2	1
3	In general, my life is going well	4	3	2	1
4	My well-being deteriorated	4	3	2	1
5	I feel happy	4	3	2	1
6	There were changes in my life for the worse	4	3	2	1
7	There is a source of joy and support in my life	4	3	2	1
8	I have problems that greatly spoil my mood	4	3	2	1
9	My life got better	4	3	2	1
10	Many things fail	4	3	2	1

*Key to part 3.* Part 3 is a life satisfaction scale. This scale assesses a person's subjective condition of satisfaction-dissatisfaction with life. To calculate the indicator on this scale, it is necessary from the sum of points scored in paragraphs 1, 3, 5, 7, and 9, deduct the sum of points scored in paragraphs 2, 4, 6, 8, and 10. Indicators of life satisfaction are in the range from -15 to +15 points.

The result from -15 to -5 points is a low level of satisfaction with life, which indicates dissatisfaction, stress, pessimism, and the need for psychological help.



The result from -4 to +4 points is an average level of satisfaction with life. The result from +5 to +15 points indicates a high level of satisfaction with life, in general, psychological well-being and an optimistic worldview.

*Part 4.* The following factors are down below, which can influence your health condition (Table 2.5). Assess your living conditions on a five-point scale: 1 – very bad; 2 – bad; 3 – satisfactory; 4 – good; 5 – excellent.

Table 2.5

### Living conditions and assessment

No.	Living conditions	Points
1	Your living conditions	
2	Conditions in the residence area (the availability of shops, services, transport, etc.)	
3	Ecological conditions in the residence area (purity of air, water, etc.)	
4	Working conditions	
5	Money, income	
6	Opportunities to use money	
7	Health care	
8	Possibilities of receiving information (radio, television, periodicals, etc.)	
9	Leisure, sports, entertainment	
10	Opportunities to communicate with art (movies, museums, books, etc.)	
11	The political situation in the residence area	
12	Social and legal protection (sense of security)	
13	Freedom of religion, political activity, etc.	

*Key to part 4.* Part 4 is a scale of satisfaction with living conditions. Calculate the sum of the points in all questions to obtain the indicator.

Points less than 32 indicate a low level of satisfaction with living conditions, low life quality and the need for psychological aid.

Points from 33 to 46 mean that living conditions are satisfactory.

Points more than 47 indicate high satisfaction with living conditions and life quality.

The questions on which you scored 1 – 2 points are the stressful aspects of your life. The questions on which you scored 4 – 5 points are the aspects of life that satisfy you.

*Part 5.* Assess your satisfaction with different parts of your life (Table 2.6). Use a five-point scale: 1 – very bad; 2 – bad; 3 – satisfactory; 4 – good; 5 – excellent.

Table 2.6

### Life aspects and assessment

No.	Life aspects	Points
1	Job (attitude to work, opportunities, etc.)	
2	Relationships in the family	
3	Children: their health and well-being	
4	Food	
5	Vacation	
6	Material well-being, safety	
7	Communication with friends, with people close in interests	
8	Situation in society	
9	Life prospects	
10	Love	
11	Favourite activity, the opportunity to express yourself in something	

Notes. There may be difficulties in questions 1, 2 and 3. Here are some explanations to them.

Question 1: If you do not work, evaluate your attitude to this.

Question 2: If you live alone, evaluate how you satisfy your family status.

Question 3: If you do not have children, evaluate your attitude to this.

*Key to part 5.* Part 5 is a scale of satisfaction of life aspects. Calculate the sum of all the points to obtain the indicator on this scale.

Points less than 30 indicate a low level of satisfaction, stress and the need for psychological aid.

Points from 31 to 41 indicate an average level of satisfaction.

Points more than 42 indicate a high level of satisfaction and psychological well-being.

**Assignment 2.** Assess the health condition with the help of the quiz.

Instruction. Read the questions. Select the answers that suit you best and highlight them.

### Quiz

1. What would you do if you saw that the bus were arriving at the bus stop earlier than you:

- a) you would try to catch it;
- b) you would skip it because there will be the next;
- c) you would speed up – maybe the bus will wait for you?

2. Would you go on a camping trip in the company of people much younger than you:

- a) no, you would not go on the camping trip at all;
- b) yes, if you are at least a little like them;
- c) reluctantly because it can be tedious?

3. If you have a working or study day harder than usual, do you lose the desire to do something in the evening that promises to be interesting:

- a) the desire doesn't disappear;
- b) the desire disappears, but you hope that you will be better, and you don't abandon the intention;
- c) the desire disappears because you need a rest?

4. What do you think about a camping trip with a family:

- a) you like it when others do it;
- b) you would be happy to join them;
- c) you need to try once to understand how you will feel on such a trip?

5. What do you usually prefer to do when you get tired:

- a) you go to bed;
- b) you drink a cup of strong coffee;
- c) you walk in the fresh air for a long time?

6. What is most important for maintaining health:

- a) you need to eat more;
- b) you need to move a lot;
- c) you need to not get tired?

7. Do you take medication regularly:

- a) you don't take medication even when you feel not well;
- b) in extreme cases, you take vitamins;
- c) yes, you take?

8. Which dish would you prefer from the following:
- a) pea soup with smoked ham;
  - b) yoghurt;
  - c) a cake with cream?
9. What is the most important to you when you go on vacation:
- a) that there be all the conveniences;
  - b) that there be at least a minimum opportunity to do sports;
  - c) that there be minimal conveniences?
10. Do you feel the weather change:
- a) you feel sick for a few days because of it;
  - b) you almost do not notice that the weather has changed;
  - c) yes, if you are tired?
11. How do you feel if you do not get enough sleep:
- a) you feel bad;
  - b) you feel that everything goes wrong;
  - c) you are so used to it that you no longer pay attention?

Key. Count the points using Table 2.7.

Table 2.7

### Answer points

No.	Answer points		
	a	b	c
1	10	5	6
2	2	10	10
3	10	6	2
4	1	10	4
5	6	4	9
6	1	9	5
7	6	9	3
8	4	10	1
9	0	10	6
10	0	10	6
11	0	7	2

More than 80 points. You feel great because you are healthy and support a healthy lifestyle.

From 50 to 80 points. There is nothing wrong with your well-being, although it happens that you are irritated or tired. It will benefit you to change something in your life.

Less than 50 points. You are overwhelmed and do not monitor health. You should change your lifestyle.

**Assignment 3.** Assess your immunity using the quiz.

Instruction. Answer the following questions to assess your immunity. The more questions you answer "yes", the more immune deficiency you have.

**Quiz**

1. Do you sometimes have problems with respiratory disease (bronchitis, sore throat, or otitis)?
2. Do you have respiratory diseases more often than 1 – 2 times a year?
3. Is it difficult for you to have respiratory diseases (how long does the disease last, and do you treat it at hospital)?
4. Does it happen that you have a temperature of 37.0 – 37.4°C for a week or more without reason?
5. Do you have any chronic inflammatory diseases (chronic bronchitis, tonsillitis, otitis, nephritis, sinusitis, etc.)?
6. Do you suffer from furunculosis or abscesses?
7. Do you suffer from fungal diseases of the skin and mucous membranes?
8. Do you suffer from periodontitis, caries or stomatitis?
9. Are you worried about frequent exacerbations of herpes?
10. Do you suffer from dysbacteriosis of unknown origin?
11. Do you have any allergic diseases?
12. Do you have any autoimmune diseases?
13. Do you suffer from any congenital anomaly of the immune system?
14. Do you have any cancer diseases?

**The self-test questions**

1. Define the concept of health.
2. Define the concept of valeology.
3. What does individual health mean?
4. What does social health mean?
5. Define the concept of genotype.

6. Define the concept of phenotype.
7. Enumerate the indicators for estimating individual health.
8. Enumerate the indicators for evaluation of social health.
9. Define the concept of homeostasis.
10. Define the concept of adaptation.
11. Enumerate the factors that affect human health.
12. Define the concept of healthy life style.

### **Practice 3**

#### **Organism's energy homeostasis type**

*The competences* are: the ability to choose and apply measures to ensure personal safety.

#### **3.1. Theory**

*Metabolism* is the sum of the chemical reactions that take place within each cell of a living organism and that provide energy for vital processes and for synthesizing new organic material [3].

Metabolism has two stages:

*catabolism* which is the breakdown of molecules to obtain energy;

*anabolism* which is the synthesis of all compounds needed by the cells.

Metabolism is closely linked to nutrition and the availability of nutrients. *Nutrition is the key to metabolism.* The metabolism pathways rely upon nutrients that they break down to produce energy. This energy, in turn, is required by the body to synthesize new protein molecules and nucleic acids (DNA, RNA).

Essential nutrients supply energy (calories) and the necessary chemicals, which the body cannot synthesize. Food provides a variety of substances that are essential for the building, upkeep, and repair of body tissues and the efficient functioning of the body.

The nutrition contains such nutrients as carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, and around 20 other inorganic elements. Most of the nutrients the organism gets from carbohydrates, lipids, and protein. Yet, in addition, vitamins, minerals and water are necessary (Fig. 3.1).

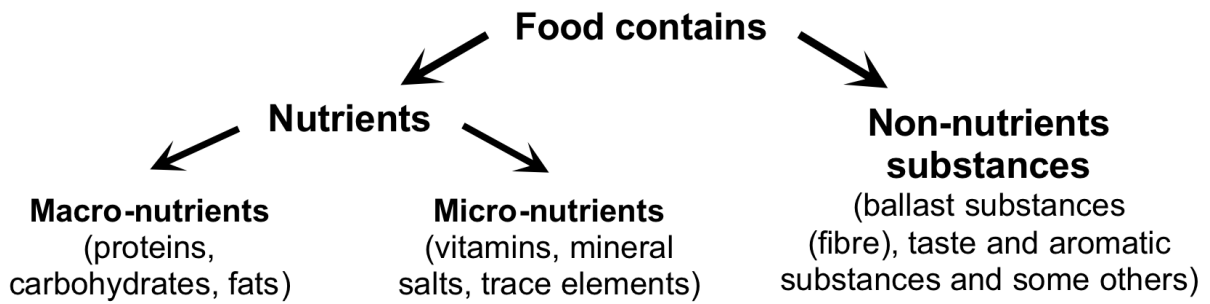


Fig. 3.1. Food components

*Nutrition* is the obtaining, digesting, absorbing and assimilating of nutrients needed to meet the organism's plastic and energy needs and form physiologically active substances [3].

A *balanced diet* is the optimal correspondence amount and ratio of all food components to the organism's physiological needs [3].

The main metabolism result is *energy formation*. Human expends energy on activity (Fig. 3.2).

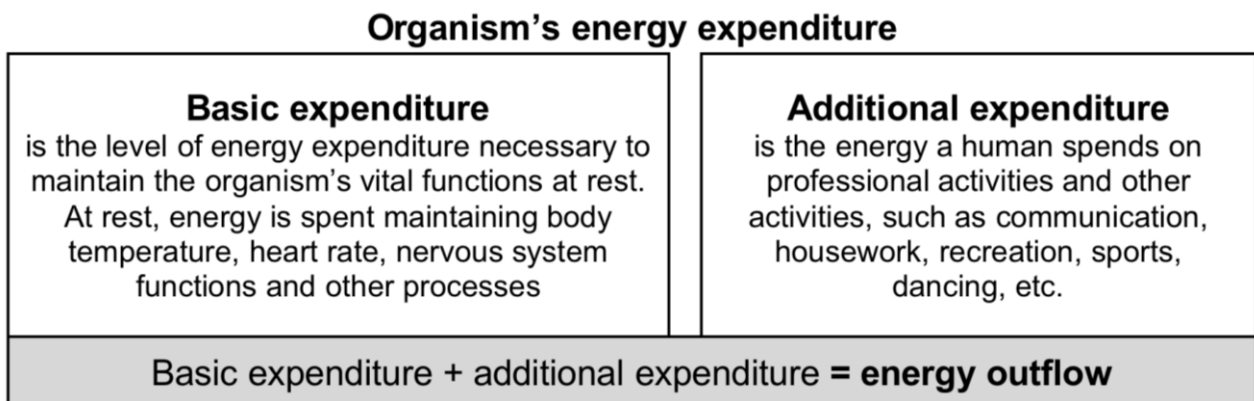


Fig. 3.2. The organism's energy expenditure

*Energy homeostasis* is a biological process of coordinated homeostatic regulation of food intake (energy inflow) and energy expenditure (energy outflow).

There are three types of energy homeostasis (Fig. 3.3).

### Energy homeostasis types

Type 1 Energy inflow is equal to the energy outflow	Type 2 Energy inflow exceeds the energy outflow	Type 3 Energy inflow is less than the energy outflow
The diet covers the organism's energy expenditure; no excess energy	Excess energy is accumulated in the body. The organism gets weight	A lack of energy arises in the organism. The organism loses weight

Fig. 3.3. The energy homeostasis

### 3.2. Practice

**Assignment.** Determine the organism's energy homeostasis type.

**Instruction.** Estimate basic and additional energy expenditures using Tables 3.1 and 3.2. Assess the amount of energy that the organism intakes using Table 3.3. Write the results in Table 3.4 and conclude the organism's energy homeostasis type.

*Basic energy expenditure.* Estimate the basic energy expenditure according to the formulas in Table 3.1 (Tkachenko's formulas).

Table 3.1

### Basic energy expenditure

Sex	Age, years	Formulas (kcal / day)
Man	10 – 17	$(16.6 \cdot \text{weight (kg)}) + 119 + 572$
Woman	10 – 17	$(7.4 \cdot \text{weight (kg)}) + (482 \cdot \text{height (metre)}) + 217$
Man	18 – 30	$(15.4 \cdot \text{weight (kg)}) - (27 \cdot \text{height (metre)}) + 717$
Woman	18 – 30	$(13.3 \cdot \text{weight (kg)}) + (334 \cdot \text{height (metre)}) + 35$
Man	31 – 60	$(11.3 \cdot \text{weight (kg)}) + (16 \cdot \text{height (metre)}) + 901$
Woman	31 – 60	$(8.7 \cdot \text{weight (kg)}) - (25 \cdot \text{height (metre)}) + 865$
Man	over 60	$(8.8 \cdot \text{weight (kg)}) + (1128 \cdot \text{height (metre)}) - 1071$
Woman	over 60	$(9.2 \cdot \text{weight (kg)}) + (637 \cdot \text{height (metre)}) - 302$

*Additional energy expenditure* depends on the intensity of the activities and their duration. The calorie expenditure per 1 hour for different activities is in Table 3.2.



**Additional energy expenditure**

No.	Activity	Expenditure of calories, kcal/hour	Activity duration, hours	General expenditure, kcal
1	Cooking	80 – 82		
2	Dressing	28 – 30		
3	Driving	50 – 55		
4	Wiping the dust	80		
5	Eating	30		
6	Work in the garden	135		
7	Ironing of things	45 – 48		
8	Making the bed	130		
9	Shopping	80		
10	Sedentary work (including office)	75		
11	Chopping firewood	280 – 300		
12	Floor washing, cleaning	130		
13	Dancing	215 – 500		
14	Badminton	255 – 500		
15	Basketball	400		
16	Bicycling	185 – 550		
17	Gymnastics	150		
18	Canoeing	185		
19	Ballroom dancing	275 – 300		
20	Dancing to disco music	400		
21	Modern dances	250		
22	Football	450		
23	Walking	120 – 150		
24	Hiking	240 – 250		
25	Jumping rope	530 – 550		
26	Running	485		
27	Running up the stairs	850 – 900		
28	Skiing	500		
29	Downhill skiing	270		
30	Skating	700 – 750		
31	Swimming	210 – 450		
32	Work in the gym	520		

The energy that the organism intakes. It can be estimated by the calories of food and dishes (Table 3.3).

Table 3.3

### Calories of food and dishes

No.	Food or dish	kcal per 100 g	The amount of eaten food or dish, g	Amount kcal
1	2	3	4	5
1	Borsch	24		
2	Meat broth	20		
3	Macaroni soup	50		
4	Milk soup with rice	76		
5	Pea soup	48		
6	Homemade noodles	87		
7	Okroshka	54		
8	Shchi	28		
9	Rozsolnyk	49		
10	Beef goulash	180		
11	Fried beef liver	200		
12	Beef chops	235		
13	Pilaf with beef	359		
14	Stewed meat	295		
15	Heart in sauce	168		
16	Fish bytochky	134		
17	Boiled fish (pike, pike perch)	70		
18	Sturgeon and stellate sturgeon baked	207		
19	Stewed fish with vegetables	218		
20	Sea bass fillet	139		
21	Vinaigrette	127		
22	Salad with radish and sour cream	117		
23	Beet salad	67		
24	Salad with cabbage and oil	83		
25	Salad with cucumbers and oil	76		
26	Salad with tomatoes and oil	108		
27	Meat salad	380		
28	Buckwheat porridge	197		
29	Rice porridge	152		
30	Pearl barley porridge	135		

Table 3.3 (continuation)

1	2	3	4	5
31	Wheat porridge	166		
32	Millet porridge	168		
33	Barley porridge	141		
34	Potato fritters	562		
35	Boiled potatoes with oil	126		
36	Zucchini paste	90		
37	Eggplant paste	91		
38	Mashed carrots	147		
39	Mashed potatoes with butter	140		
40	Macaroni	153		
41	Pancakes with cheese	195		
42	Pancakes with butter	235		
43	Varenyky with cheese	235		
44	Dumplings with potatoes	220		
45	Dumplings	298		
46	Boiled egg	56		
47	Fried eggs (2 pcs.)	202		
48	Omelet with milk	252		
49	Cocoa without sugar	60		
50	Dried fruit compote	168		
51	Kisel from fresh berries	104		
52	Coffee without sugar	2		
53	Coffee with sugar	10		
54	Coffee with milk and sugar	77		
55	Coffee with cream without sugar	58		
56	Apple juice	44		
57	Cherry juice	54		
58	Orange juice	53		
59	Grape juice	72		
60	Tea with sugar	28		
61	Sugar-free tea	2		
62	Tea with lemon and sugar	29		
63	Apricots	46		
64	Orange	38		
65	Bananas	91		
66	Grape	69		
67	Cherry	49		

Table 3.3 (the end)

1	2	3	4	5
68	Pear	42		
69	Lemon	31		
70	Tangerine	38		
71	Peaches	44		
72	Garden plum	43		
73	Persimmon	62		
74	Sweet cherry	52		
75	Apple	46		

*The energy homeostasis type can be determined in Table 3.4.*

Table 3.4

### Energy homeostasis type

Basic energy expenditure, kcal (Table 3.1)	Additional energy expenditure, kcal (Table 3.2)	Energy outflow, kcal (basic + additional energy expenditures)	Energy intake, kcal (Table 3.3)	Energy homeostasis type (energy intake – energy outflow)

### The self-test questions

1. Define the concept of metabolism.
2. What are the two stages of metabolism?
3. What is the difference between catabolism and anabolism?
4. Which components does food contain?
5. Which components do nutrients include?
6. Which components do non-nutrients include?
7. Define the concept of nutrition.
8. Define the concept of a balanced diet.
9. What types of organism energy expenditure are there?
10. What is energy outflow made up of?
11. Define the concept of an energy homeostasis.
12. What are the energy homeostasis types?

## Practice 4

### Mental processes and properties

*The competences* are: the ability to analyse the mechanisms of danger influence on humans, to determine the interaction of the human with the environmental dangers.

#### 4.1. Theory

*Psyche* is a particular type of brain activity, which consists in the reflection of the world as a result of specific interaction of living systems with the environment [2; 10].

The psyche content is the images of objects, phenomena, and events determined by a person's experience, interests, feelings, and worldview. Thus, psyche is a subjective reflection of the objective world confirmed by practice. Human psyche activity manifestations are diverse. There are the following groups of psyche phenomena (Fig. 4.1).

The study of mental processes and properties makes it possible to determine and justify the optimal values of nervous and emotional stress, the volume of perception and processing of information, the pace of work and other indicators and characteristics of the activity, which, in turn, raise the overall level of security.

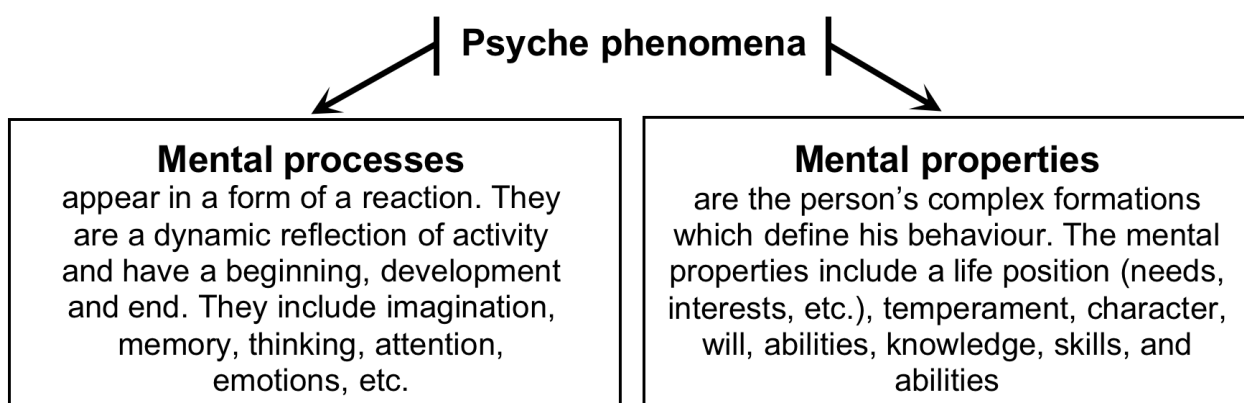


Fig. 4.1. Types of psyche phenomena

*Temperament* is a congenital feature of the human psyche, which determines the intensity and speed of responses, the degree of emotional excitability and balance, and the peculiarities of adaptation to the environment [2; 10].

*Character* is an individual combination of the most stable, essential personal features manifesting themselves in a person's behaviour in a specific attitude: to himself (the degree of demanding, critical self-evaluation); to other people (individualism or collectivism, selfishness or altruism, rudeness or politeness, lying or truthfulness, etc.); to the given task (laziness or diligence, neatness or sloppiness, initiative or passivity, responsibility or irresponsibility, etc.) [2; 10].

*Character accentuation* is the exaggerated development of specific character properties at the expense of harm to other ones. It leads to deterioration of interaction with people.

*Memory* is the process of forming, preserving, further recognizing and reproducing what was in the previous experience (Fig. 4.2).

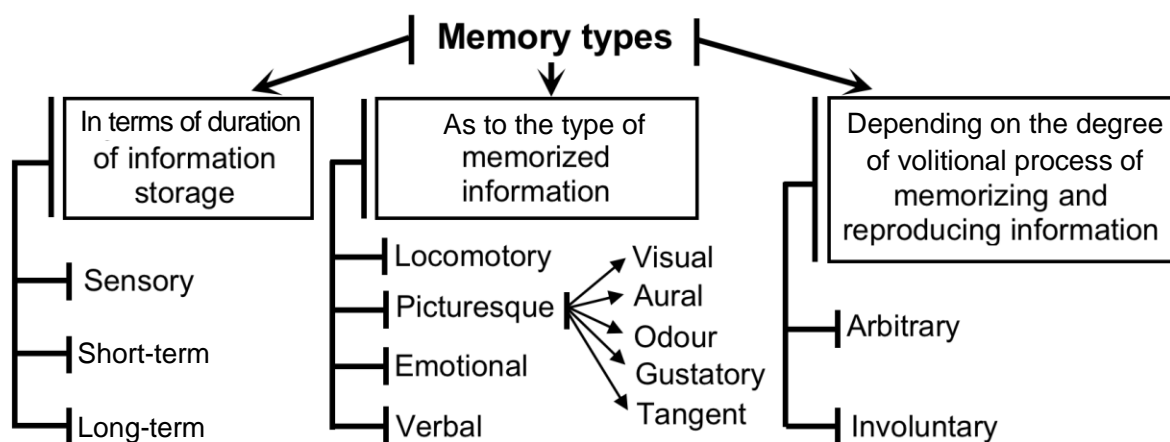


Fig. 4.2. **Memory types**

*Thinking* is an indirect, generalized reflection of human reality in concepts and judgements [11].

*Attention* is the concentration of mental activity on one or more objects (Fig. 4.3).

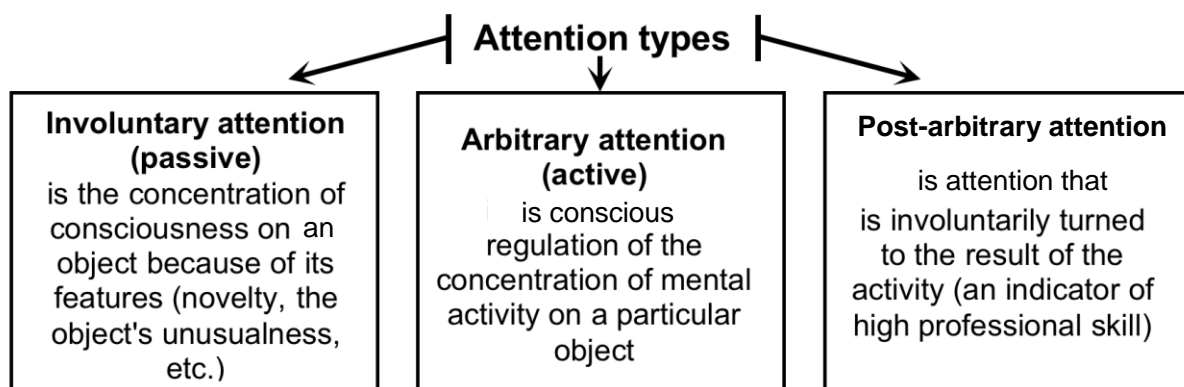


Fig. 4.3. **Attention types**

## 4.2. Practice

**Assignment.** Determine the temperament type using Cairsey's quiz.

Instruction. The quiz includes 70 assertions. Each assertion has two answers. All answers are equal – there is no right or wrong. Read each assertion and two answers. Choose the answer that is the most suitable for you. Highlight the appropriate square in Table 4.1.

### Quiz

The first series.

1. In company (at a party) you prefer:
  - a) to communicate with many people, including strangers;
  - b) to communicate with a few people (your acquaintances).
2. You are most likely a person:
  - a) more realistic than inclined to theorize;
  - b) tending to theorize rather than be realistic.
3. In your opinion, what is worse:
  - a) "flee in the clouds";
  - b) follow the well-trodden path?
4. What influences you more?
  - a) principles, laws;
  - b) emotions, feelings.
5. You are more prone to:
  - a) convince;
  - b) press on the feelings.
6. You prefer the work:
  - a) when everything is done on time;
  - b) when you do not need to bind yourself for a specific time.
7. You tend to make a choice:
  - a) quite carefully;
  - b) suddenly, impulsively.
8. In company (at a party) you:
  - a) linger late at night without feeling tired;
  - b) get tired quickly and prefer to leave earlier.
9. You are more attracted by:
  - a) reasonable people;
  - b) people with rich imagination.

10. You are more interested in:
- a) what is happening;
  - b) those events that may occur.

The second series.

1. When you evaluate actions, you tend to take into account:
  - a) the requirements of the law rather than the circumstances;
  - b) circumstances rather than the requirements of the law.
2. When addressing others, you tend to:
  - a) adhere to formalities and etiquette;
  - b) demonstrate personal, individual qualities.
3. You are a type of person:
  - a) punctual, accurate;
  - b) slow, unhurried.
4. You are more concerned about the need to:
  - a) leave cases unfinished;
  - b) bring all cases to an end.
5. In your circle of friends, you are usually:
  - a) aware of the events taking place there;
  - b) the last to learn about the news.
6. You prefer to do everyday things:
  - a) in a regular manner;
  - b) in an unusual way.
7. Do you prefer writers who:
  - a) are expressed literally, directly;
  - b) are expressed through analogies and allegories?
8. What attracts you more:
  - a) the harmony of thought;
  - b) the harmony of human relations?
9. You feel more confident:
  - a) in logical conclusions;
  - b) in practical assessments of the situation.
10. You prefer when doings are:
  - a) resolved and arranged;
  - b) not resolved and not arranged.



The third series.

1. In your opinion, you are a type of person:
  - a) serious;
  - b) carefree.
2. In telephone conversations, you:
  - a) do not think in advance about everything you need to say;
  - b) mentally "speak" what you want to say.
3. You believe that facts are:
  - a) important by themselves;
  - b) a manifestation of general patterns.
4. Dreamers usually:
  - a) irritate you;
  - b) you like them.
5. You often act as a person:
  - a) dispassionate;
  - b) excitable.
6. In your opinion, it is worse to be:
  - a) unfair;
  - b) ruthless.
7. You usually prefer to act:
  - a) carefully assessing all possibilities;
  - b) relying on the will of chance.
8. You prefer:
  - a) to buy something;
  - b) to be able to buy.
9. In company:
  - a) you are the first to start a conversation;
  - b) you wait for somebody to talk to you.
10. Common sense:
  - a) rarely makes mistakes;
  - b) often loses.

The fourth series.

1. Children often lack:
  - a) practicality;
  - b) imagination.

2. When making a decision, you are guided by:
  - a) generally accepted norms;
  - b) your feelings.
3. You are a person:
  - a) hard rather than soft;
  - b) soft rather than hard.
4. What do you think is more impressive:
  - a) the ability to methodically organise work;
  - b) the ability to be satisfied with what was achieved?
5. You value more:
  - a) certainty, completeness;
  - b) openness and variability.
6. New and unusual relationships with people:
  - a) give you energy;
  - b) tire you.
7. You often act as:
  - a) a person of practical mindset;
  - b) a person original, unusual.
8. You are more prone to:
  - a) find your own benefit in dealing with people;
  - b) understand the thoughts and feelings of others.
9. What brings you more pleasure:
  - a) careful and comprehensive discussion of the disputed issue;
  - b) reaching an agreement on the disputed issue?
10. You are rather guided by:
  - a) the mind;
  - b) the heart command.

The fifth series.

1. You prefer to perform work:
  - a) by prior arrangement;
  - b) that turned up accidentally.
2. At work, you usually prefer:
  - a) organisation, order;
  - b) coincidence, surprise.
3. You prefer to have:
  - a) many friends for a short period;
  - b) a few old friends.

4. You are guided more often by:
  - a) facts, circumstances;
  - b) general provisions and principles.
5. You are more interested in:
  - a) production and marketing;
  - b) design and research.
6. What do you recognize as a compliment:
  - a) "you are a logical person";
  - b) "you are sensitive".
7. You value in yourself:
  - a) calmness;
  - b) enthusiasm.
8. You prefer to say:
  - a) final and definite assertion;
  - b) preliminary and ambiguous opinion.
9. You feel better:
  - a) after the decision is made;
  - b) when you do not puzzle yourself by any decisions.
10. While communicating with strangers you:
  - a) easily strike up long conversations;
  - b) do not always find common ground for conversation.

The sixth series.

1. You trust more:
  - a) your experience;
  - b) your premonition.
2. You feel like a human:
  - a) practical rather than ingenious;
  - b) ingenious rather than practical.
3. Who deserves more approval:
  - a) a sensible, balanced person;
  - b) an anxious person?
4. You are more prone to:
  - a) be direct and impartial;
  - b) sympathize with people.
5. In your opinion, it is better:
  - a) to make sure that everything is prepared;
  - b) to allow events to take place as usual.

6. Relationships between people should be:
  - a) by prior arrangement;
  - b) depending on the circumstances.
7. When the phone rings, you:
  - a) try to pick up the phone first;
  - b) hope that someone else will pick up the phone.
8. What do you value more in yourself:
  - a) a sense of reality;
  - b) imagination.
9. You pay more attention to:
  - a) what was said;
  - b) how something was said.
10. What looks like a big mistake:
  - a) excessive vehemence;
  - b) objectivity and indifference.

The seventh series.

1. You consider yourself:
  - a) prudent and practical;
  - b) cordial and sensitive.
2. What situations attract you more:
  - a) regulated and ordered;
  - b) unregulated and unordered?
3. You are:
  - a) a pedantic person rather than capricious;
  - b) a capricious person rather than pedantic.
4. You prefer:
  - a) to be open and accessible to people;
  - b) to be restrained and hide feelings.
5. In books you prefer:
  - a) literalness, specificity;
  - b) imagery, figurative meaning.
6. What is harder for you:
  - a) to find common ground with others;
  - b) to use others to your advantage?
7. What would you wish yourself:
  - a) clarity of thinking;
  - b) the ability to empathize?

8. What's worse:  
 a) to be unpretentious;  
 b) to be over-capricious?
9. You prefer:  
 a) planned events;  
 b) unplanned events.
10. You tend to act:  
 a) thoughtfully rather than impulsively;  
 b) impulsively rather than thoughtfully.

Table 4.1

**Answer sheet**

No.	The first series		The second series		The third series		The fourth series		The fifth series		The sixth series		The seventh series	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
Points sum	$\Sigma a =$ $\Sigma b =$		$\Sigma a =$		$\Sigma b =$		$\Sigma a =$		$\Sigma b =$		$\Sigma a =$		$\Sigma b =$	
	Scale E-I		Scale S-N				Scale T-F				Scale J-P			
Temperament subtype:							Temperament type:							

*Key.* For scale E-I, you must write the number of answers in variants "a" and "b" in the lower cell. For scales S-N, T-F, and J-P, you have to sum answers in variants "a" and "b" by pairs for columns 4 – 6 and 5 – 7, 8 – 10 and 9 – 11, 12 – 14 and 13 – 15, respectively. You have to write these sums

in the lower cells. So, you get four pairs of numbers in the bottom sections. The sums of "a" answers correspond to the letters E, S, T, and J. The sums of "b" answers correspond to the letters I, N, F, and P. Highlight the letters (E or I, S or N, T or F, J or P) that correspond to the biggest sums in pairs. If the sums for "a" and "b" are equal (for the scale E-I it is 5 – 5, for others – 10 – 10), you do not highlight any letter. Instead, you need to put an "X" at the bottom cell, which means that you belong to a "mixed type". As a result, you get a combination of four letters. They determine the temperament subtype.

To determine the temperament type, you need to find one of the combinations of two letters in your temperament subtype. The combination of two letters means the temperament type. There are four letter combinations (and, consequently, temperament types):

*SJ* – Epimetheus;

*SP* – Dionysus;

*NT* – Prometheus;

*NF* – Apollo.

*SJ-people are Epimetheus-type representatives.* They have a highly developed sense of responsibility. They tend to maintain hierarchical relationships in the system where they work. They are well aware of the mechanisms of the relation "boss-subordinate" and can be equally successful in both roles.

The ideal for SJ-representatives is often a tribal aristocracy or a stable structure, where it is essential to preserve traditions and customs that help maintain the connection of generations. SJ-people usually (except extreme introverts) effortlessly solve everyday problems and can give odds of other types in different situations.

*SP-people are Dionysius-type representatives.* They desire freedom in a way that they understand it. Freedom for them is the ability to follow all their temptations and impulses. SP people want to be free, and others know about their freedom and impulsiveness. The activity type of SP people is often associated with a particular risk. It can be driving a race car or jet, high-voltage power lines installation or virtuoso performance of circus tricks. Most of the famous adventurers belong to the Dionysius type. SP-people like the action. They don't care about the final result. The desire for action comes out in any field. For example, a talented violinist who has achieved virtuosity may have the type SP. In this case, many hours of exercise with the instrument is not a practice to get any planned result. Playing the violin is a favourite activity of SP, and they enjoy "communicating" with musical tools.

*NT-people are Prometheus-type representatives.* In any field of activity, NT look for patterns, build schemes and models that describe all the diversity of connections in the system, and develop technology. It can be technology in chemical production, the technology of playing cards or communication with people. The assertion that "it is always done this way" can only amuse NT people, who show inexhaustible ingenuity and ruthlessly crack down on all kinds of archaisms and inconsistencies.

*NF-people are Apollo-type representatives.* NF-people are the most ambiguous temperament type. The meaning of life for NF-people is a search for the "meaning of life". NF-people are looking for a secret meaning in literally all natural phenomena. Spirituality is their main property. Often spirituality is manifested in NF-people in religiosity but sometimes in the ability to communicate with people. Also, people of this temperament type feel good in the field of fiction.

Consider the typological characteristics of sixteen temperaments subtypes. Let's characterise each option with separate "keywords" that reflect the business and personal qualities, a system of values of a particular temperament subtype.

*There are the following temperament subtypes for SJ-people type:*

*ESTJ "Administrator".* Key characteristics are responsibility, duty, hierarchy, order, practicality, openness, everything according to plan, without nonsense and unnecessary inventions, simplicity, diligence, holistic nature.

*ISTJ "Guardian".* Key characteristics are duty, a person of word, responsibility, calmness, firmness, reliability, logic, low emotionality, family man, thoroughness and detail.

*ESFJ "Merchant".* Key characteristics are openness, practicality, wisdom of life, sociability, hospitality, responsibility, customer interests above all.

*ISFJ "Conservative".* Key characteristics are calm, interests of the organization, traditions, responsibility, communication of times, everything according to the plan, care, tendency to carry out assignments rather than to manage, the owner in the house.

*There are the following temperament subtypes for SP-people type:*

*ESTP "Active".* Key characteristics are energy, play, inexhaustibility, experience in communicating with people, wit, pragmatism, work in conditions of risk and on the verge of disaster, the search for thrills, the benefit of the relationship, and risk.

*ISTP "Jack of all trades"*. Key characteristics are subordination is unnecessary conventionality for ISTP, fearlessness, desire to act, piloting, surfing, ability to handle tools (scalpel, chisel or airliner monitor), fighters, duels, formal education is an unsatisfactory option for ISTR (they often leave school and are unlikely to seek higher education).

*ESFP "Hospitable host"*. Key characteristics are optimism and warmth, avoiding loneliness, going through life laughing, life is continuous adventures, ignoring all the gloom, generosity, succumbing to temptation, an older friend for his child, the ability to work with people, rich language, science is not for them.

*IFSP "Artist"*. Key characteristics are the art (Beethoven, Tuscany, Rembrandt), Epicurean lifestyle, the sharpness of the moment, high sensitivity to shades and semitones, the subtleties of oral and written language do not usually interest them, music and dance are their areas, freedom, optimism, disobedience, a departure from all kinds of restrictions.

*There are the following temperament subtypes for NT-people type:*

*ENTP "Inventor"*. Key characteristics are intuition, enthusiasm, innovation, an important idea but not the idea itself, a charming interlocutor, initiative in communication, impatience with banal, routine operations, a good teacher, humour, and the motto "understand people!".

*ENTJ "Field Marshal"*. Key characteristics are leadership, goal orientation, logic, efficiency in work, household, intellect, demanding, tirelessness, and a career that is sometimes more important than family well-being.

*INTJ "Scientist"*. Key characteristics are self-confidence, interest in the future, while the past does not matter, the authority of the position or title does not matter, theorist, "brainstorming", logic, high leadership, lack of emotion, high ability to learn, independence, intuition, sometimes difficulties in the world of emotions and feelings.

*INTP "Architect"*. Key characteristics are a connoisseur of thoughts and language, instant assessment of the situation, logic, knowledge of the laws of nature, intelligence, to some extent arrogance, philosopher, mathematician, theorist, inexhaustible "fountain" of new ideas, sensitive and intelligent father, complex inner world, full associations.

*There are the following temperament subtypes for NF-people type:*

*ENFJ "Teacher"*. Key characteristics are leadership, sociability, attention to other people's feelings, exemplary parent, impatience with routine and monotonous activity, and the ability to distribute roles in the group.



*INFJ "Writer"*. Key characteristics are creativity, insight, successful self-education, vulnerability, not liking disputes and conflicts, rich "imagination", poetry, metaphors, love of the harmony of human relationships and psychology.

*ENFP "Journalist"*. Key characteristics are the ability to influence others, see people through, detachment from reality in search of harmony, notice everything extraordinary, sensitivity, denial of dry logic, creativity, enthusiasm, optimism, rich imagination, trader, politician, playwright, practical psychologist, generosity.

*INFP "The Asker"*. Key characteristics are calmness, idealism, self-esteem, fighting against evil for the ideals of good and justice, lyrical symbolism, writing, psychology, architecture, anyone but a businessman, and the ability to learn languages.

### **The self-test questions**

1. Define the concept of psyche.
2. What are the types of psychical phenomena?
3. Define the concept of mental processes.
4. Give examples of mental processes.
5. Define the concept of mental properties.
6. Give examples of mental properties.
7. Define the concept of temperament.
8. Define the concept of character.
9. What does the character accentuation mean?
10. Define the concept of memory.
11. What types of memory do you know?
12. Define the concept of thinking.
13. Define the concept of attention.
14. What types of attention do you know?

## **Practice 5**

### **Fatigue and stress**

*The competences* are: the ability to analyse the mechanisms of the danger influence on humans, to estimate the reaction of humans to dangers.

#### **5.1. Theory**

*The organism state* is a systemic reaction of a human to the influence of external and internal factors [2; 10].

A human experiences various states, both favourable (for instance, good health, high level of working capacity, etc.) and negative (for example depressed mood, apathy, low productivity, etc.). The greatest danger to humans is negative states. Such conditions include fatigue, stress, overexertion, etc.

*Fatigue* is a temporary decrease in human working capacity caused by intensive and prolonged work, which appears in a decline in the quantity and quality indicators of work and the deterioration of working movement coordination [11].

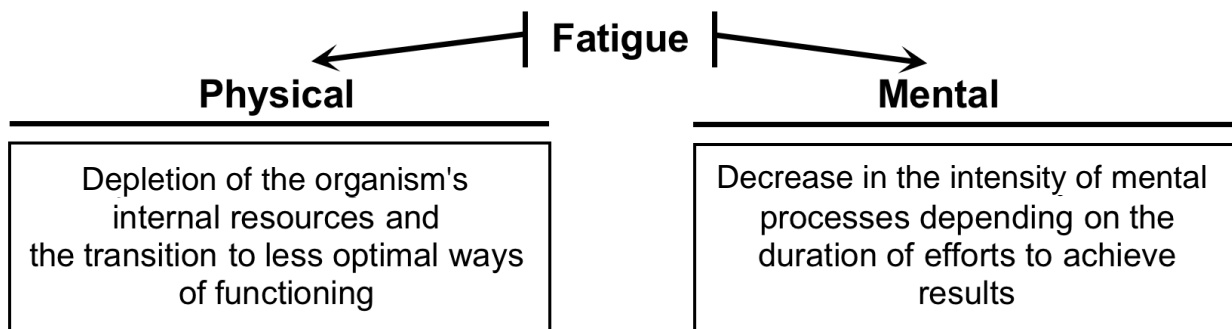
*Fatigue stages:*

a weak feeling of fatigue (lethargy, drowsiness);

deterioration of adequacy and correctness of actions with the preservation of their speed;

acute fatigue and disorganisation of activity.

There are two types of fatigue (Fig. 5.1) [2; 10].



**Fig. 5.1. Fatigue types**

*Stress* is an organism's condition forming in response to any disturbance of homeostasis.

*Stress is a complex state because of the following reasons:*

a wide range of factors that provoke the stress emergence, such as problems in family relationships, difficulties in professional activities, a difficult socio-political or military situation in the country, disease, etc.;

various stressors can simultaneously affect a person and thus enhance each other's actions;

variety of human reactions to stressors.

Stress by the form of manifestation can be classified as shown in Fig. 5.2 [2; 10].

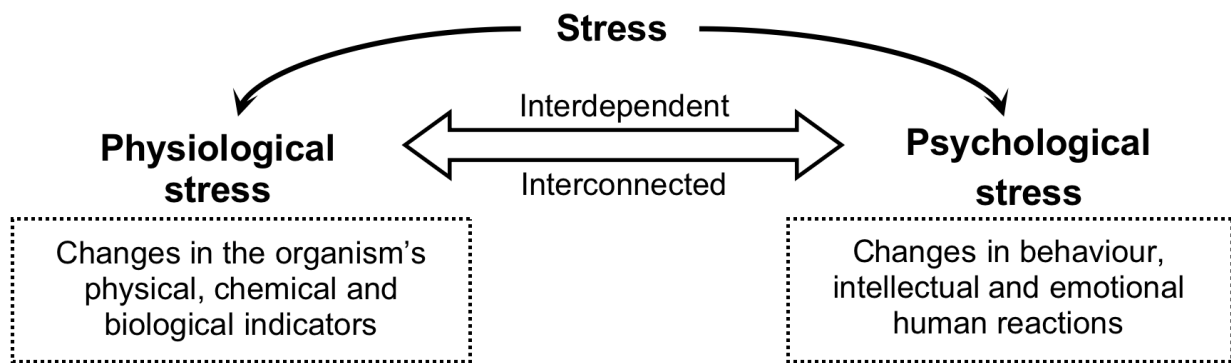


Fig. 5.2. **Stress types according to the form of manifestation**

Depending on the nature of consequences stress can be classified as shown in Fig. 5.3 [10].

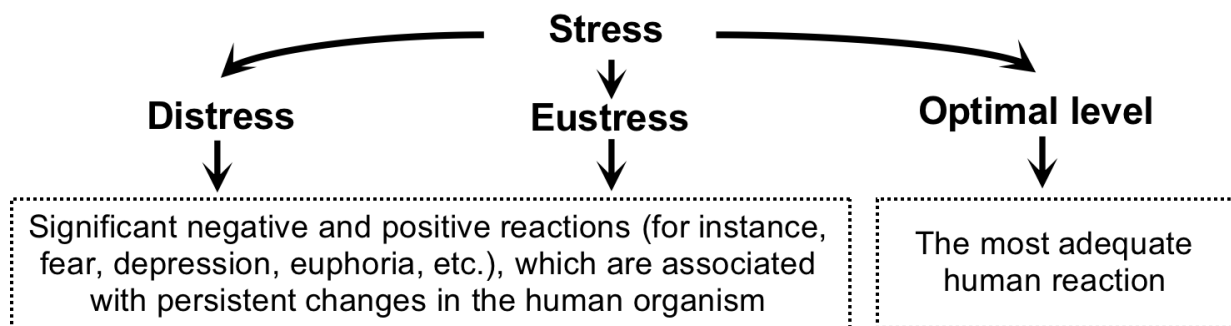


Fig. 5.3. **Stress types depending on the nature of consequences**

*Monotony* is an organism state that develops under a monotonous workload associated with long-term performance of the same elementary actions or with a continuous steady concentration of attention in conditions of sensory information deficiency [11].

The main reasons for the development of the state are uniformity and simplicity of operations; lack of creative elements in work; fast rhythm of action; lack of intellectual and emotional load, etc.

Monotony is accompanied by unpleasant subjective feelings, which are manifested in a decline of interest in the work performed, boredom, apathy, inattention, drowsiness, etc. Ultimately, it leads to the human's perception of the work as uninteresting.

*Overstrain* is an unfavourable condition of individual physiological systems or organs due to excessive or prolonged loads of these systems or organs [11].

Overstrain is one of the main risk factors for the development of neuro-psychiatric and cardiovascular diseases. As a result of overstrain, the resistance of the human to various adverse effects is reduced, which can lead to the aggravation of chronic diseases.

## 5.2. Practice

**Assignment 1.** Assess the degree of physical and mental fatigue with the help of the Hessen psychosomatic quiz.

Instruction. Assess the intensity of complaints about physical well-being, which are a consequence of fatigue and overfatigue. Indicate the cell in Table 5.1 that corresponds to your health condition at the current moment.

Table 5.1

### Hessen psychosomatic quiz

No.	Symptoms	0 no	1 slightly	2 a little	3 significantly	4 highly
1	2	3	4	5	6	7
1	Feeling weak					
2	Palpitation, heart failure or fading heart					
3	The feeling of pressure or fullness in the abdomen					
4	Increased drowsiness					
5	Pain in the joints and extremities					
6	Dizziness					
7	Back pain					
8	Pain in the neck (nape) or shoulder joints					
9	Vomit					
10	Nausea					
11	The feeling of a lump in the throat, narrowing of the throat or spasm					
12	Eructation					
13	Heartburn or sour belching					
14	Headaches					
15	Rapid exhaustion					
16	Fatigue					
17	Feeling stunned (blackout)					

Table 5.1 (the end)

1	2	3	4	5	6	7
18	Feeling of heaviness in the legs					
19	Apathy					
20	Stinging or pulling pains in the chest					
21	Stomach pain					
22	Shortness of breath					
23	Feeling of pressure in the head					
24	Heart attacks					

*Key.* The numbers down below are the numbers of the asserts in Table 5.1. The points corresponding to these asserts get to be summed up.

1. "Exhaustion". Sum up points for answers to questions 1, 4, 15, 16, 17, and 19.

This scale indicates the general loss of vital energy by the organism.

2. "Stomach complaints". Sum up points for answers to questions 3, 9, 10, 12, 13, and 21.

The scale shows the syndrome of nervous (psychosomatic) gastric diseases.

3. "Rheumatic factor". Sum up points for answers to questions 5, 7, 8, 14, 18, and 23.

The scale expresses the subjective human suffering of a spastic nature.

4. "Heart complaints". Sum up points for answers to questions 2, 6, 11, 20, 22, and 24.

The scale indicates the localisation of diseases mainly in the vascular area.

5. "Intensity of complaints". This scale includes all 24 of the complaints and is the sum of previous scales. The scale characterizes the overall emotional intensity of complaints. Sum up points for answers to questions 1, 2, ... 24.

The estimations for the first four scales are in the range 0 ... 24 points. The assessment for the fifth scale is in the range 0 ... 96 points. The higher the points, the higher the physical and mental fatigue.

**Assignment 2.** Assess the level of psychological stress with "The self-assessment of emotional condition" quiz.

Instruction. Choose in each set of assertions the one that best suits your current condition. Write the assertion number in the appropriate line for answers ( $I_1 = \dots$ ,  $I_2 = \dots$ , etc.) in the "Key" section.

## Quiz

### *Calmness – anxiety.*

10. Complete calm. I'm self-confident.
9. I'm cold-blooded, confident and not worried.
8. I feel complete well-being, confident and feel at ease.
7. In general, I'm optimistic and have no anxiety.
6. Nothing particularly worries me. I feel at ease.
5. Somewhat concerned, I feel awkward, and a little anxious.
4. I feel nervous, worried, and annoyed.
3. I feel significant uncertainty. It's terrible.
2. I feel tremendous anxiety and concern. I'm exhausted by fear.
1. Mad with fear. I'm frightened by unresolved difficulties.

### *Energy – fatigue.*

10. The life force runs high.
9. Great energy and desire to work.
8. A lot of energy. I feel inspired.
7. I feel well. I have enough energy for activity.
6. I feel peppy and moderately energetic.
5. Slightly tired. Laziness. Lack of energy.
4. I'm tired. I have no energy.
3. Great fatigue. Low energy.
2. I'm tired. Almost exhausted and almost unable to act.
1. Exhausted. Unable even to make a little effort.

### *Inspiration – oppression.*

10. Strong rise, enthusiastic fun.
9. Excited, in an elevated state. Delight.
8. Excited and in good mood.
7. I feel excellent. Cheerful.
6. I feel pretty good, "okay".
5. I feel a little depressed, "so-so".
4. The mood is depressed and a little sad.
3. Depressed. The mood is gloomy.
2. Very depressed. I feel just awful.
1. Extreme depression and sadness. Everything is black and grey.

*Self-confidence – helplessness.*

10. Nothing is impossible for me. I can do whatever I want.
9. I feel self-confident. Confident in my accomplishments.
8. Confident in my abilities.
7. I feel that my abilities are enough. I have good prospects.
6. I feel competent.
5. I feel that my skills and abilities are somewhat limited.
4. I don't feel self-confident.
3. Depressed by my weakness and lack of abilities.
2. I feel miserable and unhappy. Tired of my incompetence.
1. Oppressive feelings of weakness and futility. I can't do anything.

*Key.* I – individual self-evaluation, which corresponds to the number of the assertion selected from the scale.

I<sub>1</sub> – "Calmness – anxiety". The lower the value of I<sub>1</sub>, the higher the anxiety;

I<sub>2</sub> – "Energy – fatigue". The lower the value of I<sub>2</sub>, the more fatigue;

I<sub>3</sub> – "Inspiration – oppression". The lower the value of I<sub>3</sub>, the greater the depression;

I<sub>4</sub> – "Self-confidence – helplessness". The lower the value of I<sub>4</sub>, the greater the feeling of helplessness;

I<sub>5</sub> – total (on four scales) assessment.  $I_5 = I_1 + I_2 + I_3 + I_4$ . The lower the value of I<sub>5</sub>, the higher the level of psycho-emotional stress.

**Assignment 3.** Assess the level of physical stress using the quiz (Table 5.2).

Instruction. Highlight the number in Table 5.2 corresponding to the frequency of condition symptoms. Sum up the points for answers.

Table 5.2

**Physical condition characteristics**

No.	Physical condition	Never	Rarely (less than once every six months)	Sometimes (less than once a month)	Often (more than once a week)	Constantly
1	2	3	4	5	6	7
1	Prolonged headaches	1	2	3	4	5
2	Migraines	1	2	3	4	5

Table 5.2 (the end)

1	2	3	4	5	6	7
3	Stomach pain	1	2	3	4	5
4	High blood pressure	1	2	3	4	5
5	Cold hands	1	2	3	4	5
6	Heartburn	1	2	3	4	5
7	Frequent breathing	1	2	3	4	5
8	Diarrhoea	1	2	3	4	5
9	Sweating hands	1	2	3	4	5
10	Nausea	1	2	3	4	5
11	Flatulence	1	2	3	4	5
12	Frequent urination	1	2	3	4	5
13	Sweating feet	1	2	3	4	5
14	Oily skin	1	2	3	4	5
15	Fatigue / exhaustion	1	2	3	4	5
16	Dry mouth	1	2	3	4	5
17	Hand tremor	1	2	3	4	5
18	Back pain	1	2	3	4	5
19	Neck pain	1	2	3	4	5
20	Chewing movements of the jaws	1	2	3	4	5
21	Gritting teeth	1	2	3	4	5
22	Constipation	1	2	3	4	5
23	Feeling of heaviness in the heart	1	2	3	4	5
24	Dizziness	1	2	3	4	5
25	Vomit	1	2	3	4	5
26	Accelerated heartbeat	1	2	3	4	5
27	Cramps	1	2	3	4	5
28	Asthma	1	2	3	4	5
29	Indigestion	1	2	3	4	5
30	Reduced pressure	1	2	3	4	5
31	Hyperventilation	1	2	3	4	5
32	Joint pain	1	2	3	4	5
33	Dry skin	1	2	3	4	5
34	Stomatitis	1	2	3	4	5
35	Allergy	1	2	3	4	5

Key. From 40 to 75 points. Your organism can withstand physiological stress.

From 76 to 100 points. The probability of physiological stress is small.

From 101 to 150 points. The likelihood of physiological stress is high.



With more than 150 points. Physiological stress is likely to have already affected your health.

**Assignment 4.** Identify the causes that lead to the appearance of stress using the Anderson stress scale (Table 5.3).

Instruction. Highlight the events in Table 5.3 that happened to you last year.

Table 5.3

**Life events and assessment of the events**

Life events	Points
1	2
Entering a university	50
Marriage	77
More or fewer personal problems	38
Work during training	43
Death of wife (husband)	87
An abrupt change in sleep patterns (sleep has become shorter or longer)	34
Death of a close relative	77
Changing the selected specialization	41
A sudden change in the usual diet (the time of meals or food quantity)	30
Changing your habits, social circles, clothing style	45
Death of a close friend	68
Committing acts punishable by law	22
An outstanding personal achievement	40
Birth or adoption of a child	68
A sudden change in your health or the health of a family member	56
Sexual problems	58
Problems with the law	42
Rarer or more frequent meetings with family members	26
A drastic change in financial status (for the better or worse)	53
The appearance of a new family member	50
Change of residence or living conditions	42
Significant interpersonal conflict or reassessment of values	50
Change related to religion (you have become a believer or, conversely, an atheist)	36
Dismissal	62
Divorce	76
Change of work	50
A significant change in interpersonal relationships with husband (wife)	50

Table 5.3 (the end)

1	2
A significant change in job responsibilities (promotion, large bonus, demotion, transfer)	47
Changing the work mode of your husband (wife)	41
Prolonged separation from husband (wife)	74
Changing the style of rest	57
Serious injury or illness	65
Change in alcohol consumption (increase or decrease)	46
Increased or abandoned social work	48
Increased sense of independence or responsibility	49
A long trip during vacation	33
Betrothal	54
Transfer to another university	50
Changing the daily routine	41
Problems with the administration or teachers of the university	44
Rupture of an engagement or permanent relationship	60
Changing in self-esteem, self-identification, self-awareness or general self-image	57

*Key.* Multiply the number of events that happened to you during the year by their points. For example, two times per year were long trips during vacation. Points for this event are 33. So, we have:  $2 \times 33 = 66$  points. Then, sum up the points of all events.

150 – 199 points. Stress experienced in the last year caused a disease in 37 % of cases.

200 – 299 points. Stress experienced in the last year caused a disease in 51 % of cases.

300 or more points. Stress experienced in the last year caused a disease in 79 % of cases.

### **The self-test questions**

1. Define the concept of organism state.
2. Define the concept of fatigue.
3. What are the stages of fatigue?
4. Define the concept of physical fatigue.
5. Define the concept of mental fatigue.
6. Define the concept of stress.

7. How are the types of stress classified according to the form of manifestation?
8. How are the types of stress classified according to the nature of consequences?
9. Define the concept of monotony.
10. Define the concept of overstrain.

## **Theme 3. Natural environment: characteristics and impact on humans**

### **Practice 6**

#### **Natural environment: characteristics and impact on humans**

*The competences* are: the ability to identify dangerous environmental factors and choose ways to reduce their negative impact.

#### **6.1. Theory**

*The natural environment* is an aggregate of abiotic and biotic factors, natural and altered as a result of human activity, that affect humans and other organisms [1; 9].

*Abiotic factors* are an aggregate of inorganic substances and environmental conditions that are the basis for the biosphere's existence.

*Biotic factors* are an aggregate of living organisms affected by their vital activity to other organisms, including humans.

*Meteorological sensitivity* is the organism's natural reaction to significant changes in the environment [1; 9].

*Biological rhythm* is a self-sustaining autonomous process of periodic alternation of the organism's conditions and fluctuations in physiological processes and reactions (Fig. 6.1) [2; 10].

*Endogenous and exogenous biorhythm synchronisation* is the consistency of an organism's internal processes with environmental conditions, one of the conditions for the organism's normal functioning.

*Desynchrony* is a disorder of synchronicity of endogenous and exogenous rhythms or internal processes (Fig. 6.2) [10].

### Biorhythms depending on the nature of origin

Endogenous (physiological or working) rhythms	Exogenous (adaptive) rhythms
are fluctuations reflecting the activity of the organism's systems over time. There are more than 100 biorhythms in the human organism that reflect various physiological and psychological processes	are fluctuations with periods close to the main geophysical cycles, the role of which is to adapt the organism to periodic changes in the environment
<b>Examples:</b> alternations of human activity and rest during the day, change of internal organs activity, etc.	<b>Examples:</b> alternation of day and night, change of seasons, increase or decrease of the Sun activity, etc.

Fig. 6.1. Classification of biorhythms according to the nature of origin

### Desynchrony

External desynchrony	Internal desynchrony
occurs under the inconsistency of internal biorhythms and environmental conditions. For example, seasonal <u>desynchronisation</u> of the organism	occurs in case of violation of the coordinated work of biorhythms in the organism. For example, change in the food rhythm to modes of rest and activity

Fig. 6.2. Desynchrony classification

*Working capacity* is the organism's ability to withstand the working loads for an appropriate time upon the conservation of the quantitative and qualitative indicators of activity (Fig. 6.3) [2; 10].

### Working capacity

General (potential)	Actual
is the maximum amount of work that humans can perform upon the condition of mobilization of all organism resource	is the amount of work that a human performs with the appropriate intensity in a certain time and upon the condition of the recovery of resources expended by the organism

Fig. 6.3. Working capacity types

Let's consider the factors that determine the organism's working capacity (Fig. 6.4) [10].

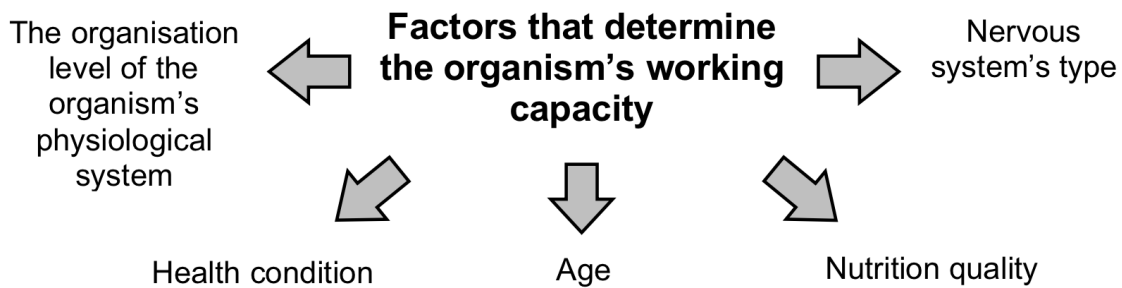


Fig. 6.4. **Factors that determine the organism's working capacity**

## 6.2. Practice

**Assignment 1.** Estimate the level of meteorological sensitivity using the quiz.

Instruction. Read the questions. You have to answer "yes" or "no" to each question. Put 10 points for each positive answer and 5 points for each negative answer in Table 6.1. Sum up the points.

### Quiz

1. Do you read the weather forecast every day and keep the schedule of unfavourable days well visible?
2. Can you discuss the weather with colleagues, friends and relatives for a long time?
3. Have you ever felt bad after climate change?
4. Do you feel the weather change and your predictions are usually correct?
5. Do you feel a magnetic storm in a few days: do you get tired, irritable, or have insomnia?
6. Do you look much worse on unfavourable days? Do bags and circles appear under your eyes?
7. Does your appetite worsen on adverse days? Do you feel discomfort in the stomach?
8. Do you learn about changes in the weather from aches in the joints and prickly pain in the heart?
9. Does illness last due to weather changes more than 2 – 3 days?
10. Do you prefer to lie in the morning longer instead of wellness treatments (morning exercise, contrast shower)?

### Points for answers

No.	Points	No.	Points
1		6	
2		7	
3		8	
4		9	
5		10	

*Key.* Points from 50 to 70. Occasionally there is a decline in physical activity, but it is most likely not related to the weather conditions but fatigue or stress.

Points from 71 to 90. You are a meteorologically sensitive person. To make it easier to withstand temperature changes and magnetic storms, get healthy: exercise in the morning, give up tobacco and alcohol, choose a balanced diet, spend more time outdoors, take long walks.

Points from 91 to 100. Your organism is sensitive to changes in weather conditions. If you want to feel well, choose a healthy lifestyle.

**Assignment 2.** Estimate the level of meteorological sensitivity using the quiz.

Instruction. Read the questions. Choose one of the suggested answers and put the number from the brackets in Table 6.2. Sum up the points.

### Quiz

1. In the morning, you get up:

- a) at the same time (5);
- b) at dawn (1);
- c) when you feel, you've slept enough (3).

2. It is beautiful winter weather outside. However, you have a bad day.

What thoughts do you have?

- a) you regret that everything fell on you on such a beautiful day when you take a walk in the fresh air (5);
- b) you are not upset or worried about it (1);
- c) you believe there is no good weather in winter (3).

3. Waking up in the morning, first of all:

- a) you look out the window to assess the weather (3);
- b) you are interested in the indications of the thermometer (5);
- c) you turn on the TV or radio (1).

4. You need to do a lot of things. You wake up in the morning and see a blizzard outside. Your reaction:

- a) soon your blood pressure rises, the headache begins (1);
- b) you are annoyed by a sharp change in weather (3);
- c) you rejoice in what you see because a blizzard is a beautiful natural phenomenon (5).

5. You planned to spend the weekend in nature and go downhill skiing, but the weather suddenly got worse. Your actions:

- a) you are not used to changing your plans so go skiing in any case (3);
- b) skiing in strong winds and cold is not your way, so you invite friends to spend time in a warm and cosy place, such as a coffee shop (5);
- c) you cancel the trip and stay at home (1).

6. Which of the statements is closer to you:

- a) there is no bad weather, every weather is good (5);
- b) six months of bad weather... (1);
- c) there is no bad weather condition. There is inappropriate clothing (3).

7. Imagine that you have decided to participate in the game "The Last Hero" and suddenly find out that you have to live on a tropical island where the air temperature does not fall below 40 °C. Your actions:

- a) you refuse to take part in the game because you don't like such a climate (5);
- b) you will be pleased because you like the tropical climate (1);
- c) you do not mind but hesitate a little, fearing for your health (3).

8. What time of year do you choose for your vacation:

- a) you take a vacation in winter and rest in warm countries (3);
- b) you want to extend the summer, so you take a vacation in early September (1);
- c) you prefer to rest in summer, but this time you are going to set off to the mountains, where you can go skiing (5).

9. Winter. You are driving a car. A wheel got stuck in a snowdrift. Your actions:

- a) you will be upset and think about who to call for help (1);
- b) you will scold the weather and push the car at the same time (5);

c) you call the emergency service, and while you are waiting for it, go outside to breathe the frosty air (3).

10. The plane departure was delayed because of bad weather conditions. Your actions:

a) you will be worried because timely arrival at the destination is essential for you (5);

b) you will not be too upset and go to the nearest cafe to drink coffee or tea before departure (1);

c) you take it as a sign of fate and hand over the ticket (3).

Table 6.2

### Points for answers

No.	Points	No.	Points
1		6	
2		7	
3		8	
4		9	
5		10	

*Key.* Points from 10 to 23. Not only your physical condition but also your mood depends on the weather. On a rainy day, you usually desire to get home faster, hide under a blanket and drink a cup of hot tea.

Points from 24 to 37. This result indicates that you have an optimistic outlook on life, and no weather conditions can spoil your mood. However, if your affairs are not quite as you would like, you may not notice the great weather.

Points from 38 to 50. You are a creative person and draw inspiration from any situation. Natural phenomena motivate you to look for beauty in them. Of course, ice and wet snow do not give you much pleasure, but, settling in a cosy apartment by the window, you can enjoy watching them.

### **Assignment 3.** Estimate the daily chronotype using Ostberg's quiz.

Instruction. Read the questions and answer them without breaking the suggested sequence. Each question has several answers. Choose only one, and write the points in Table 6.3. Sum up the points.



## Quiz

1. What time would you like to wake up if you were free to choose your daily routine and guided solely by personal desires?

Points	Time	
	Winter	Summer
1	5.00 – 6.45	4.00 – 5.45
2	6.46 – 8.15	5.46 – 7.15
3	8.16 – 10.45	7.16 – 9.45
4	10.46 – 12.00	9.46 – 11.00
5	12.01 – 13.00	11.01 – 12.00

2. What time would you like to go to bed if you were free to plan your evening and guided solely by personal desires?

Points	Time	
	Winter	Summer
1	20.00 – 20.45	21.00 – 21.45
2	20.46 – 21.30	21.46 – 22.30
3	21.31 – 00.15	22.31 – 01.15
4	00.16 – 01.30	01.16 – 02.30
5	01.31 – 03.00	02.31 – 04.00

3. Do you need an alarm clock if you need to get up at a precise time in the morning?

Answers	Points
Not needed at all	4
In some cases it is necessary	3
The need for an alarm clock is quite significant	2
I can't manage without an alarm clock	1

4. If you have to prepare for an exam in a strictly limited time and use night-time for classes (from 23.00 to 02.00 at night), will you work productively?

Answers	Points
I could not work at all	4
I could have some benefit	3
The work would be quite effective	2
The work would be highly effective	1

5. Do you usually get up easily in the morning?

Answers	Points
Very difficult	1
Quite difficult	2
Easy enough	3
Very easy	4

6. Do you feel completely awake in the first half-hour after sleep?

Answers	Points
Very sleepy	1
Slight sleepy	2
The head is quite clear	3
Complete clarity of thoughts	4

7. Do you want to eat in the first half-hour after waking?

Answers	Points
There is no appetite at all	1
Appetite is low	2
Pretty good appetite	3
Excellent appetite	4

8. If you get to prepare for exams in a limited time and use the morning time for preparation (from 04.00 to 07.00), will you be productive at this time?

Answers	Points
I could not work at all	1
I could have some benefit	2
The work would be quite effective	3
The work would be highly effective	4

9. Do you feel physically tired in the first half-hour after sleep?

Answers	Points
Very high flaccidity	1
Slight flaccidity	2
Slight cheerfulness	3
Full peppiness	4

10. If you know the next day you do not work, when will you go to bed?

Answers	Points
Not later than usual	4
1 hour or less later	3
1 – 2 hours later	2

11. Is it easy to fall asleep under the usual conditions?

Answers	Points
Very difficult	1
Quite difficult	2
Easy enough	3
Very easy	4

12. You decided to strengthen your health with the help of physical exercise. Your friend suggested that you practice together for 1 hour twice a week. Your friend prefers to do this from 7 to 8 am. Is this the best period for you?

Answers	Points
At this time, I am in good shape	4
I would be in a pretty good shape	3
It would be difficult for me	2
It would be tough for me	1

13. In the evening you feel so tired that you go to bed at:

Answers	Points
20.00 – 21.00	5
21.01 – 22.15	4
22.16 – 00.45	3
00.46 – 02.00	2
02.01 – 03.00	1

14. When doing long-term work that requires you to fully mobilize mental forces, which of the four proposed periods would you choose for this work if you were utterly free to plan your daily routine and guided only by personal desires?

Answers	Points
8.00 – 10.00	6
11.00 – 13.00	4
15.00 – 17.00	2
19.00 – 21.00	0

15. How great is your fatigue before 11 pm?

Answers	Points
I'm very tired	5
I'm not very tired	3
I'm a little tired	2
I'm not tired at all	0

16. For some reason, you had to go to bed a few hours later than usual. The next day there is no need to get up at a particular time. Which of the four options is best for you?

Answers	Points
I wake up at a particular time and can't fall asleep again	4
I wake up at a specific time and take a nap	3
I wake up at a particular time and fall asleep again	2
I wake up later than usual	1

17. You must be on duty at night from 4 to 6 o'clock. The next day you have a day off. Which of the four options will be most favourable for you?

Answers	Points
I sleep only after the night work shift	1
Before the work shift, I doze. After the work shift, I go to sleep	2
Before the work shift, I get a good night's sleep. After the work shift, I will doze	3
I sleep before the work shift	4

18. You get to perform heavy physical work for 2 hours. What time would you prefer to do this if you were completely free to plan your daily routine and could be guided solely by personal desires?

Answers	Points
8.00 – 10.00	4
11.00 – 13.00	3
15.00 – 17.00	2
19.00 – 21.00	1

19. You decided to strengthen your health with the help of physical exercise. Your friend suggested that you practice together for 1 hour twice a week. Your friend prefers to do this from 22 to 23 am. Is this the best period for you?

Answers	Points
I am in good shape at this time	1
I would be in a pretty good shape	2
It would be difficult for me	3
It would be tough for me	4

20. What time did you wake up in childhood during school holidays upon the condition of unregulated getting-up time?

Answers	Points
5.00 – 6.45	5
6.46 – 7.45	4
7.46 – 9.45	3
9.46 – 10.45	2
10.46 – 12.00	1

21. Imagine that you are free to choose your working hours. Suppose you have a 5-hour day; the work is interesting for you. Choose five continuous hours when your work efficiency would be the highest.

Answers	Points
00.01 – 05.00	1
05.01 – 10.00	5
10.01 – 15.00	3
15.01 – 20.00	2
20.01 – 01.00	1

22. In what workday period do you reach the top of your activity?

Answers	Points
00.01 – 04.00	1
04.01 – 08.00	5
08.01 – 09.00	4
09.01 – 14.00	3
14.01 – 17.00	2
17.01 – 24.00	1

23. To which type, morning or evening, do you belong?

Answers	Points
Only to the morning type	6
More likely to the morning type than to the evening one	4
More likely to the evening type than to the morning one	2
Only to the evening type	0

**Points for answers**

No.	Points	No.	Points	No.	Points	No.	Points	No.	Points
1		6		11		16		21	
2		7		12		17		22	
3		8		13		18		23	
4		9		14		19			
5		10		15		20			

*Key.* The daily chronotype can be estimated based on the sum of points.

Chronotype	Points
Clearly expressed morning type	More than 92
Unclearly expressed morning type	77 – 91
Arrhythmia type	58 – 76
Unclearly expressed evening type	42 – 57
Clearly expressed evening type	Less than 41

**The self-test questions**

1. Define the concept of natural environment.
2. Define the concept of abiotic factor.
3. Define the concept of biotic factor.
4. Define the concept of meteorological sensitivity.
5. Define the concept of biological rhythm.
6. What type of biological rhythms do you know?
7. Define the concept of desynchrony.
8. What type of desynchrony do you know?
9. Define the concept of working capacity.
10. What type of working capacity do you know?
11. What are the factors that determine the organism's working capacity?

## **Theme 4. Technogenic environment: characteristics and impact on humans**

### **Practice 7**

#### **Technogenic environment: characteristics and impact on humans**

*The competences* are: the ability to assess the safety of technological processes and equipment and justify measures to improve it.

##### **7.1. Theory**

*Technogenic environment* is an artificial environment of human activity, which he created consciously or at haphazard [9; 10].

*Working environment* is the space in which a human implements labour activity [9; 10].

*Working conditions* are a combination of factors that affect human health and working capacity. They include noise, vibration, indoor micro-climate parameters, lighting, electromagnetic fields and radiation, etc. [9; 10].

*Labour organisation* is a system of measures providing conditions for optimal human functioning in the labour activity process [9].

*Household environment* is a set of residential buildings, sports and cultural facilities, utilities, transport, technical devices for household purposes, etc., that human uses in everyday life [9].

*Technogenic dangers* are conditions inherent in technical systems, industrial or transport facilities, which manifest themselves in the form of a negative impact that affects humans and the environment; or in the form of direct or indirect damage to humans and the environment during regular operation of these facilities and systems [1; 6].

*Career guidance* is a system of measures aimed at identifying the personal characteristics, interests and abilities of each individual to assist them in choosing a profession that best suits their abilities.

*Professional consultation* is a scientifically organized system of interaction between a consultant and a person who needs help in choosing or changing a profession. Professional consultancy involves the study of individual psychological characteristics, current life situation, professional interests, and the person's health condition, taking into account the needs of the labour market.

*Professional selection* is a system of measures that helps identify candidates whose personal qualities, are most suitable for training and further professional activity in a particular speciality [2; 9].

*Medical selection* assesses those peculiarities of an individual's organism that enable him or her to successfully master a certain speciality for a particular period of time and to work long-term without harm to health.

*Educational selection* aims to identify those people whose initial knowledge ensures successful mastery of this speciality or direct performance of professional duties.

*Social selection* identifies individual's social characteristics necessary for successful work in a team that reflect the willingness of the employee to perform professional duties.

*Psychophysiological selection* is designed to identify individuals whose abilities and individual psychophysiological capabilities correspond to the requirements of a particular speciality.

## 7.2. Practice

**Assignment 1.** Assess the most suitable type of activity using the quiz "Best professional activities".

Instruction. Read the assertions. If you agree with them, then write the points in brackets in the appropriate column of Table 7.1 with the sign "+" (column number is indicated by Roman numerals). If you disagree, write points with the sign "-". For example: "I willingly make something by hand, repair" (II-1). If you agree with this statement, then in column II ("human-technic") write "+1", if you disagree, then in column II write "-1".

When you finish the quiz, sum up the points in each column considering the pluses and minuses. The highest sum corresponds to the recommended occupation type for you. The lowest (or even the negative sum) indicates an unsuitable occupation.

### Quiz

1. I easily meet new people (V-1).
2. I willingly make something by hand, repair (II-1).
3. I like to go to museums, theatres and art exhibitions (IV-1).
4. I willingly take care of plants and pets (I-1).
5. I willingly count something, solve problems and draw (III-1).
6. I willingly help seniors to care for pets and plants (I-1).
7. I like to spend time with small children to help them with something (V-1).



8. I usually make a few mistakes in my writing (III-1).
9. What I create with my hands usually raises interest of my friends (II-2).
10. Seniors believe I have abilities in a specific field of art (IV-2).
11. I like to read about flora and fauna (I-1).
12. I take active participation in amateur art (IV-1).
13. I read willingly about the construction of mechanisms, machines and devices (II-1).
14. I willingly solve crossword puzzles and riddles (III-2).
15. I quickly settle quarrels between peers or juniors (V-2).
16. Seniors believe I can work with technic (II-2).
17. The results of my artistic work attract attention even of strangers (IV-2).
18. Seniors believe I can work with plants or pets (I-2).
19. Usually, I manage to express my thoughts in detail and clearly to others in writing (III-2).
20. I rarely quarrel (V-1).
21. Things made by myself are approved even by strangers (II-1).
22. I learn previously unfamiliar or foreign words without much effort (III-1).
23. I often help strangers (V-2).
24. I can do my favourite artwork (music, drawing, etc.) for a long time, without getting tired (IV-1).
25. I read with great interest information about protection of the environment, forests, and animals (I-1).
26. I like to learn the schemes of mechanisms, machines and devices (II-1).
27. I usually manage to convince my peers that it is necessary to do something in a particular way and not otherwise (V-1).
28. I willingly watch animals or study plants (I-1).
29. I easily understand schemes, graphs, drawings and tables (III-2).
30. I try my hand at painting, music and poetry (IV-1).

Table 7.1

### Types of professional activity

I Human – nature	II Human – technic	III Human – sign system	IV Human – art	V Human – human
$\Sigma =$	$\Sigma =$	$\Sigma =$	$\Sigma =$	$\Sigma =$

*Key. Human – nature.* If you like to work in the garden, care for plants and pets, take interest in biology, then get acquainted with such the professions as "human – nature". The work objects for these professions' representatives are animals and plants, conditions of their growth and life.

Requirements of these profession types for a person: developed imagination, image thinking, good visual memory, observation, ability to anticipate and evaluate changing natural factors, patience, perseverance, readiness to work outside teams, sometimes in difficult weather conditions, in the mud, etc.

*Human – technic.* If you like laboratory work in physics, chemistry and electrical engineering, if you make models, understand household appliances, if you want to create, operate or repair machines, mechanisms, devices and machines, then get acquainted with the professions "human – technic".

Requirements of these profession types for a person: good coordination of movements, visual, auditory, vibrational and kinesthetic perception, technical and creative thinking, ability to switch and concentrate and observation.

*Human – sign system.* If you like to perform calculations, drawings, diagrams, keep files and systematise various information, if you want to do programming, economics or statistics, etc., then get acquainted with such professions as "human – sign system".

Requirements of these profession types for a person: good operative and mechanical memory, ability to concentrate long on sign material, fast distribution and switching of attention, accuracy of perception, ability to see what is behind symbols, perseverance, patience, logical thinking.

*Human – art.* These profession types are associated with the creation, artworks design (writer, artist, composer, fashion designer, architect, sculptor, journalist, choreographer); with reproduction and production of various products according to the sample (jeweller, restorer, engraver, actor, carpenter); with the distribution of works of art in mass production (master of porcelain painting, grinder of stone and crystal, painter, printer).

Requirements of these profession types for a person: artistic abilities, developed visual perception, observation, visual memory, visual thinking, creative imagination and knowledge of the psychological laws of emotional action on people.

*Human – human.* Most professions of this type are related to education, training of people (educator, teacher, sports coach), medical care (doctor, paramedic, nurse), household services (seller, hairdresser, waiter, janitor), information services (librarian, guide, lecturer), etc.

Requirements of these profession types for a person: the desire to communicate, the ability to easily come into contact with strangers, friendliness, sensitivity, endurance, ability to control emotions, understanding intentions and mood of other people, the ability to understand human relationships, the ability to resolve differences between them, to organize interaction, ability to speak, facial expressions, gestures, developed language, the ability to find common ground with different people, the ability to persuade people, neatness, punctuality, concentration, human psychology knowledge.

**Assignment 2.** Assess the ability to influence other people using the quiz down below.

Instruction. Answer "yes" or "no" to the questions. Write down answers in Table 7.2. Points for the answers are in Table 7.3. Sum up the points.

### Quiz

1. Would you choose the profession of actor or politician?
2. Are you annoyed by people who dress extravagantly?
3. Do you allow outsiders to talk about their intimate relationships?
4. Do you immediately react if you feel offended?
5. Do you feel uncomfortable if your colleague has got higher success in business than you?
6. Would you take on a hard job to prove that you can do it?
7. Is the principle "the purpose justifies the means" always correct for you?
8. Do you like to be often with friends?
9. Do you have a schedule for the whole day?
10. Do you like to rearrange the furniture in the apartment?
11. Do you like to use different means to achieve the same goal every time?
12. Are you ironic about a person if you see that he is very self-confident?
13. Do you like to unmask your bosses if they have false authority?

Table 7.2

### Answers and points

No.	Answer	Points	No	Answer	Points
1	2	3	4	5	6
1			8		
2			9		
3			10		

Table 7.2 (the end)

1	2	3	4	5	6
4			11		
5			12		
6			13		
7					

Table 7.3

### Points

No.	Answer "yes"	Answer "no"	№	Answer "yes"	Answer "no"
1	5	0	8	0	5
2	0	5	9	0	5
3	5	0	10	5	0
4	5	0	11	5	0
5	5	0	12	5	0
6	5	0	13	5	0
7	5	0			

*Key.* If you have 35 – 65 points, you have unique abilities to influence others. You can teach them something, efficiently work with people, and give them advice. You believe that a person should not shrink into himself and avoid people. However, it can happen that if you are very confident in your beliefs, then, losing control of yourself, you can become a tyrant.

If you have 0 – 34 points, it isn't easy to convince you of something. You believe that your life and the lives of others should be strictly foreseen. You don't like to do anything under the whiplash. Sometimes you can be too indecisive, which prevents you from achieving your goal.

### The self-test questions

1. Define the concept of technogenic environment.
2. Define the concept of working environment.
3. What does the term "working conditions" mean?
4. What does the term "labour organisation" mean?
5. Define the concept of household environment.
6. What does the term "career guidance" mean?
7. What does the term "professional consultation" mean?

8. What does the term "professional selection" mean?
9. Describe the principles of medical selection.
10. Describe the principles of educational selection.
11. Describe the principles of social selection.
12. Describe the principles of psychophysiological selection.

## **Practice 8**

### **Human resources**

*The competences* are: the ability to assess resources for ensuring counter-action to the influence of dangers.

#### **8.1. Theory**

There are different views on the concept definition. According to occupational psychology (Bodrov V.), human resources are human physical and spiritual capabilities, which ensure the implementation of programs and behavioural strategies for humans to prevent or alleviate stress. There are two types of resources:

*personal resources*, which include psychological, physical and professional abilities, qualities and skills of humans;

*environmental resources*, which involve the opportunity to receive support from social environment and material safety of a person.

According to stress psychology (N. Vodopyanova), human resources are internal and external variables contributing to psychological stability in stressful situations. These are emotional, motivational-volitional, cognitive and behavioural constructs that a person actualises to adapt to stressful work and life situations. In this case, stress means any events that cause a tense state in a person.

In the frame of occupational safety, there is a concept of *a personal potential (resource) of the employee* that means the degree of professional qualities and personality traits development, ensuring successful labour tasks and solutions to production problems.

The well-known Hobfoll's theory of conservation of resources includes the concept of resources. According to this theory, resources are all, which is necessary to human and helps to adapt to difficult life situations. This definition has a significant advantage over the above because it covers various aspects of human life and considers the possibility of obtaining different types of resources and using them. Consider the classification of human resources according to the theory of conservation of resources (Fig. 8.1) [11].

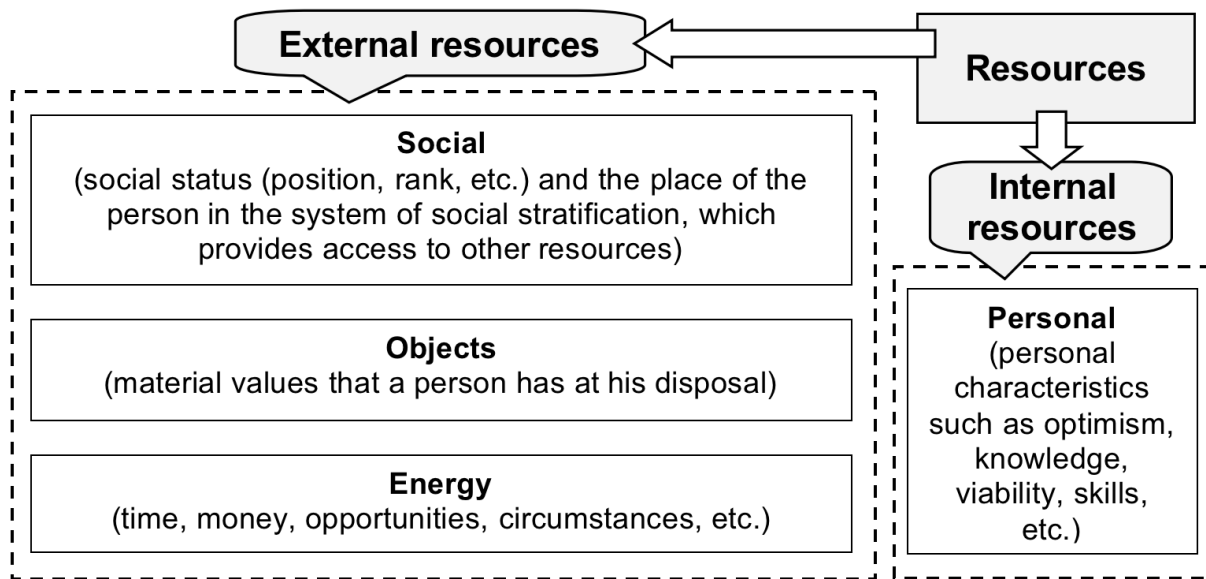


Fig. 8.1. **Hobfoll classification of human resources**

A necessary condition for human development and safety is the investment of resources. Investing resources, people can get new resources and use those already available. Thus, the so-called "cycle of resources" appears. Its efficiency defines the level of human safety. However, in most cases, a person invests resources guided by intuitive feelings rather than practical knowledge. It can lead to positive results (multiplication of available and obtaining new resources) and negative ones (loss of resources without a possibility of rapid recovery).

The negative consequences of resource investment lead to a stressful condition in a person that provokes erroneous actions and the emergence of dangerous situations. Adverse effects of investment of resources occur in the following cases [11]:

*ignorance* (or misunderstanding) of their own resources;

*narrowly directed investment* (when a person invests resources in the development of only one or more resource types);

*erroneous assessment of investment and future results* (a person invests more resources than receives, etc.).

In all cases, imbalance of resources takes place, which creates conditions for dangerous situations.

*Imbalance of resources* is contravention of the ratio between getting resources and investing.

It is necessary to train employees to manage their resources to reduce the likelihood of imbalance of resources.

*Resource management* is the most appropriate use by an employee of the available resources following the enterprise's goals upon the condition of health conservation [6].

Constant transformation of requirements to staff increases the likelihood of dangerous situations. Therefore, formation of the employee's skill to manage resources is a necessary condition for creating new approaches to ensuring safety. This skill enables employees to determine which resources they need for further development, which require active use and which ones require implementing both processes simultaneously.

## 8.2. Practice

**Assignment 1.** Assess the balance of resources using the quiz (Table 8.1).

Instruction. The quiz contains assertions in pairs. The first part of the statement is the resource name. The second one is investment. Action algorithm:

read each assertion;

in the cell opposite the resource in the column "mark", put a sign "+" if you currently possess the resource, "-" if you haven't got it;

in the cell opposite investing in the column "mark", put a sign "+" if the resource was invested, "-" if it was not invested;

calculate the balance of resources by formula (8.1).

Attention! Resources and investments made over the last three months are to be assessed.

Table 8.1

### Quiz

No.	Resource	Mark	Investment	Mark
1	2	3	4	5
Personal resource				
1	New knowledge, skills, abilities		Application of knowledge, skills and abilities in practical activity	
2	Health, well-being		Achieving certain goals	
3	Lifestyle (sports, bad habits, etc.)		Health, well-being	
4	High level of working capacity		Achieving certain goals	
5	Self-motivation		Application of knowledge, skills, abilities in practical activity	
6	Understanding the life meaning		Achieving important goals	
7	Hardiness		Development of skills to control the current situation	

Table 8.1 (the end)

1	2	3	4	5
		Sum:		Sum:
Social resources				
8	Financial income		Creating a "financial cushion"	
9	Social support at work		Forming a sense of confidence in the future	
10	Social guarantees (availability of medical care, paid leave, etc.)		Health, well-being	
11	Social status		Obtaining new knowledge, skills, abilities	
		Sum:		Sum:
Objects resources				
12	Psychological climate at home		Health, well-being	
13	Residence place		Stability of the current situation	
14	Availability of necessary household items		Stability of the current situation	
15	Rational and complete nutrition		Health, well-being	
16	Rest (enough sleep, regular weekends)		Health, well-being	
17	Savings		Safety, health, well-being	
18	Safety level in society		Health, well-being	
		Sum:		Sum:
Energy resources				
19	Time		Personal development, health, well-being	
20	Money		Personal development	
21	Opportunities (self-education, social elevator, etc.)		Professional development	
22	External circumstances (change of residence, change of activity, transfer to another position, etc.)		Hardiness	
		Sum:		Sum:
	Overall score (R):		Overall score (I):	

$$\text{Resources balance (RB)} = \text{Overall score (R)} - \text{Overall score (I)}. \quad (8.1)$$

*Key.* If RB is in the range from -5 to +5, it indicates a balanced process of obtaining and investing resources.



If RB is in the range from -22 to -6, it means an imbalance of resources; you spend more resources than you receive.

If RB is in the range from +6 to +22, it indicates an imbalance of resources; you receive more resources than you invest.

**Assignment 2.** Assess the hardiness using the quiz.

Instruction. Read the assertion, choose the answer and highlight the appropriate cell (Table 8.2).

Table 8.2

**Hardiness quiz**

No.	Assertion	No	Rather no	Rather yes	Yes
1	2	3	4	5	6
1	I am often unsure of my decisions				
2	Sometimes it seems to me that no one cares about me				
3	Often, even after a good night's sleep, I can hardly force myself to get out of bed				
4	I am constantly busy, and I like it				
5	I often prefer to "go with a flow"				
6	I change my plans depending on the circumstances				
7	I am annoyed by events that cause me to change my daily routine				
8	Unforeseen difficulties sometimes tire me out				
9	I am always in control of the situation as much as necessary				
10	Sometimes I get so tired that nothing can interest me				
11	Sometimes everything I do seems useless to me				
12	I try to be well informed about everything that happens around me				
13	It is better to have a tit in the hands than a crane in the sky				
14	In the evening, I often feel slack				
15	I prefer to set hard-to-achieve goals and achieve them				
16	Sometimes, I am afraid of thoughts about the future				
17	I am always confident that I can bring to life what I have in my mind				

Table 8.2 (the end)

1	2	3	4	5	6
18	It seems to me that I do not live but only play a role				
19	If I had fewer disappointments and adversities in the past, it would be easier for me to live in the world now				
20	Problems that arise often seem insoluble to me				
21	Having experienced defeat, I will try to take revanche				
22	I like meeting new people				
23	When someone complains that life is boring, he doesn't notice precious moments				
24	I always have something to do				
25	I can always influence the result of what is happening around me				
26	I often regret what already done				
27	If the problem requires much effort, I prefer to postpone it until better times				
28	I find it difficult to bond with other people				
29	As a rule, others listen to me carefully				
30	If I could, I would change a lot from the past				
31	I often put off until tomorrow what is hard to do or what I am not sure about				
32	It seems that life is passing by me				
33	My dreams rarely come true				
34	Surprises give me an interest in life				
35	Sometimes it seems to me that all my efforts are in vain				
36	Sometimes I dream of a calm life				
37	I lack the persistence to finish what I started				
38	Sometimes life seems to me monotonous and colourless				
39	I have no ability to influence unexpected problems				
40	People underestimate me				
41	As a rule, I work with pleasure				
42	Sometimes I feel redundant even with friends				
43	It happens that so many problems fall on me that I give up				
44	Friends respect me for my tenacity and inflexibility				
45	I willingly take on the implementation of new ideas				

## Key

Answers to direct assertions are assigned points from 0 to 3:

No – 0 points.

Rather no – 1 point.

Rather yes – 2 points.

Yes – 3 points.

Answers to reverse assertions are assigned points from 3 to 0:

No – 3 points.

Rather no – 2 points.

Rather yes – 1 point.

Yes – 0 points.

Sum up points for the separate sub-scales (commitment, control, and challenge (Table 8.3)) for direct and reverse assertions. After that, sum up the points for three sub-scales (Table 8.4). The total sum is the level of hardiness.

Table 8.3

### Direct and reverse assertions for sub-scales

Sub-scales	Direct assertions	Reverse assertions
Commitment	4, 12, 22, 23, 24, 29, 41	2, 3, 10, 11, 14, 28, 32, 37, 38, 40, 42
Control	9, 15, 17, 21, 25, 44	1, 5, 6, 8, 16, 20, 27, 31, 35, 39, 43
Challenge	34, 45	7, 13, 18, 19, 26, 30, 33, 36

Table 8.4

## Results

Sub-scales	Points
Commitment	
Control	
Challenge	
Hardiness	

Compare the obtained results and the normative values in Table 8.5. Conclude the results of comparison.

### Normative values

	Hardiness	Commitment	Control	Challenge
Low level	61 and below	29 and below	21 and below	9 and below
Average level	62 ... 99	30 ... 46	21 ... 38	10 ... 18
High level	100 and higher	47 and higher	39 and higher	19 and higher

### The self-test questions

1. Define the concept of resources according to Hobfoll's theory of conservation of resources.
2. What types of resources are there according to Hobfoll's theory of conservation of resources?
3. Describe the external resources.
4. Describe the internal resources.
5. In which cases do adverse effects of investment of resources occur?
6. Define the concept of an imbalance of resources.
7. Define the concept of resource management.

## Theme 5. Social environment: characteristics and impact on humans

### Practice 9

#### Social environment: characteristics and impact on humans

*The competences* are: the ability to identify dangerous social environment factors and suggest ways to prevent their negative impact.

#### 9.1. Theory

*Social environment* is an aggregate of material, economic, social, political and spiritual conditions of existence, formation and activity of individuals and social groups [10; 11].

*Social macro-environment* is a socio-economic system of society as a whole (for instance, a country).

*Social micro-environment* is an immediate social environment of a person (for example, a team).

*Social dangers* are phenomena, events or processes that can harm a person, a social group, society, a state, a human community and the Earth as a place of human habitation [10; 11].

Social dangers are various in their manifestations, for instance, the use of illicit substances, fraud, robbery, looting, war, terrorism, disease, and so on. The risk of social dangers is directly related to the country's economic, political, and cultural development. The higher this level, the lower this risk, and vice versa.

*Global (international) safety* is a situation in the world in which there is no threat to general peace in the world and particular regions of the planet, guaranteed stable development of the world community in all life spheres, there are all conditions for conflict prevention and confrontation in all its manifestations.

*Social adaptation* is the process of active human adaptation to a changing environment through various social means. There are active and passive social adaptations. An indicator of successful social adaptation is the individual's high social status in this environment and his satisfaction with it. An indicator of unsuccessful social adaptation is the individual's movement to another social environment or behaviour that deviates from society's norms.

*A team* is a group of individuals who interact with each other in a certain way, realise their belonging to this community, and are recognized as its members from others' points of view.

*A socio-psychological climate of a team* is the nature of the relationship between people, the prevailing tone of social mood in the group associated with satisfaction with living conditions, style and level of management, and other factors [10; 11].

*Conflict* is a clash of oppositely directed, incompatible tendencies in an individual's consciousness, interpersonal interactions or relationships of individuals or groups associated with acute negative experiences [11].

*Communication* is a specific form of people interaction during their cognitive and labour activity, which is carried out mainly through language (rarely through other sign systems) [11].

## 9.2. Practice

**Assignment 1.** Answer the quiz on the perception of a group by a person.

Instruction. The quiz includes assertions containing three choices. For each point of the test, you need to choose the answer that suits you best. The

test has an answer sheet. Highlight your answer in the answer sheet against the corresponding question number. You can select only one answer to each question.

### Quiz

1. The best partners in the group are:
  - a) those who know more than I do;
  - b) those who seek to resolve all issues together;
  - c) those who do not distract the teacher.
2. The best teachers are those:
  - a) who have an individual approach;
  - b) who create conditions for help from others;
  - c) who create an atmosphere in the team in which no one is afraid to speak out.
3. I'm glad when my friends:
  - a) know more than I do and can help me;
  - b) can independently, without interfering with others, achieve success;
  - c) help others when the opportunity arises.
4. What I dislike most is when:
  - a) no one helps in the group;
  - b) other students hinder me performing the task;
  - c) other students are less prepared than I am.
5. It seems to me that I am capable of the maximum when:
  - a) I can get help and support from others;
  - b) my efforts are rewarded;
  - c) there is an opportunity to show helpful initiative for everyone.
6. I like teams in which:
  - a) everyone is interested in improving the results of all;
  - b) everyone is busy with their business and does not interfere with others;
  - c) everyone can use others to solve their problems.
7. Students rate lowest the teachers:
  - a) who create a spirit of rivalry between students;
  - b) who do not pay enough attention to them;
  - c) who do not create conditions for the group to help them.
8. The greatest pleasure in life is:
  - a) the opportunity to work when no one is bothering you;
  - b) the ability to obtain new information from other people;
  - c) the opportunity to do good to other people.

9. The essential purpose of school is:
- education of people with a developed sense of duty to others;
  - training of people adapted to independent living;
  - training of people who know how to benefit from communication with other people.
10. If a group has a problem, then:
- I prefer that others solve this problem;
  - I prefer to work independently, not relying on others;
  - I seek to contribute to the joint solution of the problem.
11. I would study better if:
- the teacher had an individual approach to me;
  - the teacher created conditions for me to receive help from others;
  - the teacher encouraged students' initiative aimed at achieving overall success.
12. There is nothing worse than when:
- you cannot succeed on your own;
  - you feel unnecessary in the group;
  - others don't help you.
13. What I appreciate most is:
- personal success, in which there is a share of merit of my friends;
  - general success, in which there is my merit;
  - success achieved at the cost of my own efforts.
14. I would like:
- to work in a team in which the basic techniques and methods of joint work are used;
  - to work individually with the teacher;
  - to work with leading people in this field.

*Key.* Each highlighted answer in Tables 9.1 – 9.3 is 1 point. Sum up points on each table separately.

Table 9.1

**Individualistic type**

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer	C	A	B	B	B	B	B	A	B	B	A	A	C	B

Table 9.2

**Collectivist type**

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer	B	C	C	A	C	A	A	C	A	C	C	B	B	A

Table 9.3

**Pragmatic type**

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer	A	B	A	C	A	C	C	B	C	A	B	C	A	C

*Explanations.*

1. The person perceives the group as an obstacle to his own activities or relates to it neutrally. The group is not a value for the person. Such position manifests in the avoidance of joint activities, in the predominance of individual work and in restricting contacts. This type of perception of the group is called *individualistic*.

2. The person perceives the group as a value. The problems of the group and its individual members have a significant meaning for the person. The person needs joint activities. This type of perception of the group is called *collectivist*.

3. The person perceives the group as a means of achieving individual goals. In this case, the person perceives and evaluates the group in terms of its usefulness. Such a person prefers the most competitive colleagues who can provide assistance, serve as sources of the necessary information, etc. This type of perception of the group is called *pragmatic*.

**Assignment 2.** A quiz for assessment of social values of a person.

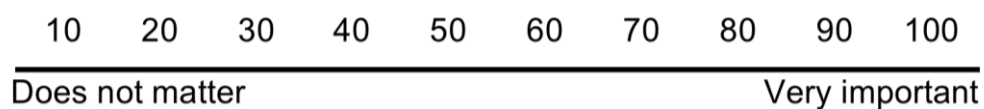
Instruction. Assess the significance of characteristics on the scale given in Fig. 9.1.

**Quiz**

1. Exciting work that pleases you.
2. A job with a high salary.
3. Successful marriage.



4. Meeting new people at social events.
5. Involvement in public activities.
6. Your religion.
7. Sports exercises.
8. Intellectual development.
9. Career.
10. Beautiful cars, clothes, houses, etc.
11. Spending time with family.
12. Several close friends.
13. Work on a voluntary basis.
14. Meditation, prayers, etc.
15. A healthy balanced diet.
16. Reading educational literature, watching educational programs, self-improvement, etc.



**Fig. 9.1. The scale of significance of characteristics**

*Key.* Write the points on each assertion above in the appropriate cell in Table 9.4 (the cell number is the assertion number). Sum up overall points on each social value as shown in Table 9.4.

Table 9.4

**Person's social values**

No.	Points	No.	Points	Overall points	Social values
1		9		assertion 1 + assertion 9 = ____	Professional
2		10		assertion 2 + assertion 10 = ____	Financial
3		11		assertion 3 + assertion 11 = ____	Family
4		12		assertion 4 + assertion 12 = ____	Social
5		13		assertion 5 + assertion 13 = ____	Public
6		14		assertion 6 + assertion 14 = ____	Spiritual
7		15		assertion 7 + assertion 15 = ____	Physical
8		16		assertion 8 + assertion 16 = ____	Intellectual

The higher the overall points in each social value, the more significant this value is for you. And, the closer the grades for all social values are to each other, the more universal you are.

**Assignment 3.** Identify your "would rather" ways to react in conflict situations using the following quiz.

Instruction. Read each assertion and choose one that describes your behaviour in most situations. Highlight the selected answer.

### Quiz

1. a. Sometimes, I let others take responsibility for resolving a contentious issue.  
b. Rather than discussing what we disagree on, I try to draw attention to what we both agree on.
2. a. I try to find a compromise solution.  
b. I try to resolve the conflict by considering the other person's interests and my own ones.
3. a. I usually seek to achieve my goal.  
b. Sometimes, I sacrifice my own interests for the sake of another person.
4. a. I try to find a compromise solution.  
b. I try not to offend the feelings of another person.
5. a. I always try to find support in another person when I try to resolve a controversial situation.  
b. I try to do everything to avoid futile tension.
6. a. I try to avoid trouble for myself.  
b. I seek to achieve my goal.
7. a. I seek to postpone the resolution of the disputed issue to resolve it definitively.  
b. I think it is possible to sacrifice something to achieve the goal.
8. a. I usually seek to achieve my goal.  
b. First of all, I want to determine what controversial issues have appeared.
9. a. I think that it's not always worth worrying about the arising disagreements.  
b. I try to achieve my goal anyway.
10. a. I try to achieve my goal.  
b. I try to find a compromise solution.
11. a. I want to clearly define what the issue is.  
b. I seek to reassure another person and preserve our relationship.

12. a. I often avoid situations that could provoke discussion.  
 b. I give another person an opportunity to stay at his opinion if he also goes to meet.
13. a. I suggest a intermediate position.  
 b. I will make an effort to make everything my way.
14. a. I inform another person about my opinion and ask about his views.  
 b. I show others the logic and benefits of my views.
15. a. I try to calm the other and keep the relationship.  
 b. I try to do everything necessary to avoid stress.
16. a. I try not to offend the feelings of others.  
 b. I usually try to convince others of the benefits of my view.
17. a. Usually, I seek to achieve my goal.  
 b. I try to do everything to avoid futile tension.
18. a. If it makes another person happy, I let him insist on his opinion.  
 b. I let another person to stay at his opinion if he goes to meet.
19. a. First of all, I try to determine what the controversial issue is.  
 b. I postpone controversial issues to finally resolve them with time.
20. a. I try to overcome our discrepancies immediately.  
 b. I try to find an optimal combination of benefits and losses for both of us.
21. a. I try to be attentive to another person during the negotiations.  
 b. I always prefer to discuss the problem directly.
22. a. I try to find an intermediate position for both of us.  
 b. I defend my position rigidly.
23. a. I usually try to satisfy the desire of each of us.  
 b. I let others take responsibility for resolving a contentious issue.
24. a. If another person insists on his opinion, I try to meet it.  
 b. I try to persuade another to compromise.
25. a. I try to convince others of my rightness.  
 b. I try to be attentive to the arguments of others during negotiations.
26. a. I usually offer an intermediate opinion.  
 b. I always seek to satisfy the interests of each of us.
27. a. I often try to avoid disputes.  
 b. If it makes another person happy, I let him insist on his position.
28. a. Usually, I seek to achieve my goal.  
 b. I usually try to find support from someone else when resolving a situation.
29. a. I suggest an intermediate position.  
 b. I think it's not always worth worrying about the arising disagreements.

30. a. I try not to offend the feelings of another person.  
 b. I always take such a position in the debate to achieve success together.

*Key.* Calculate the number of coincided responses with the key (Table 9.5) for all sections. Compare the obtained points in sections. The section with the highest points is the form of your preferable behaviour in a conflict situation.

Table 9.5

**Key**

No.	Rivalry	Cooperation	Compromise	Avoidance	Adaptation
1	2	3	4	5	6
1				a	b
2		b	a		
3	a				b
4			a		b
5		a		b	
6	b			a	
7			b	a	
8	a	b			
9	b			a	
10	a		b		
11		a			b
12			b	a	
13	b		a		
14	b	a			
15				b	a
16	b				a
17	a			b	
18			b		a
19		a		b	
20		a	b		
21		b		a	
22	b		a		
23		a		b	
24			b		a
25	a				b
26		b	a		
27				a	b

Table 9.5 (the end)

1	2	3	4	5	6
28	a	b			
29			a	b	
30		b			a
Points	$\Sigma =$	$\Sigma =$	$\Sigma =$	$\Sigma =$	$\Sigma =$

**Assignment 4.** Determine the level of sociability using the quiz.

Instruction. Read the assertion, choose the answer and write it in the appropriate cell in Table 9.6.

**Quiz**

1. Being in the compartment or cabin of an aircraft, you prefer:
  - a) to remain silent without coming into contact with neighbours;
  - b) to contact when it is necessary but without desire;
  - c) to take contact proactively without complications;
  - d) to share secret thoughts with strangers.
2. You maintain your relations with friends and relatives:
  - a) rare visits (3 – 4 times a year);
  - b) more frequent visits (5 – 10 times a year);
  - c) regular mutual visits (more than once a month);
  - d) weekly and frequent appointments.
3. How many greeting cards do you receive during the year:
  - a) 1 – 5; b) 6 – 10; c) 11 – 15; d) 16 and more?
4. You have already left school (graduated from a university). The fate of how many of your friends do you know in detail?
  - a) 1 – 3; b) 4 – 10; c) 11 – 15; d) 16 and more?
5. How much time do you spend on average on a phone call:
  - a) 1 – 3 minutes; b) 4 – 5 minutes; c) 6 – 10 minutes; d) from 15 minutes and more?
6. When you read a new book:
  - a) you think about what you are reading;
  - b) you answer questions about what you have read, but reluctantly;
  - c) you readily answer questions about what you have read;
  - d) you actively share impressions.

7. During a movie, performance or concert:

a) you do not like when someone expresses their impressions;

b) you are tolerant when someone tells their impressions. You find it interesting;

c) you sometimes exchange remarks with acquaintances;

d) you cannot keep silent; you try to express your opinion as often as possible.

8. When you meet friends on the street:

a) if there are no urgent matters to them, you nod and walk past;

b) you respond to greetings and exchange short remarks;

c) you don't care who is the first to greet; you readily learn about the news;

d) you are the first to stop, greet, ask questions and talk about yourself.

9. Returning home after work (study):

a) you prefer to be silent;

b) you answer questions briefly;

c) you ask the family about the news, but reluctantly, formally;

d) you ask the family about the news and tell them about yourself.

10. Being in a foreign city (unfamiliar area) and looking for the institution you need, the address you do not know:

a) you prefer to go around the streets in the district, independently searching for the institution;

b) you prefer to identify by eye a resident among passers, ask him, and in case of an unsatisfactory answer, continue an independent search;

c) you prefer to stop passers asking for help, but, at the same time, you feel uncomfortable;

d) you seek help from passers without feeling uncomfortable.

11. When walking around the city or park:

a) you prefer to be alone;

b) you prefer to be in the company of one person;

c) you prefer to be in the company of several friends or relatives;

d) you prefer to be in a big company.

12. You noticed a new thing about an acquaintance:

a) you evaluate it silently;

b) you tell your opinion if you are asked;

c) you actively express your opinion;

d) you ask about the price, about where it was bought and comment on your impressions.

13. When you read fiction:

- a) you usually prefer a short poem or a short story;
- b) you choose a cycle of poems, a collection of short stories;
- c) you do not notice how long the story is; it should be interesting;
- d) you read well-known novels and poems that have good reviews.

14. If you are accidentally in an unknown company:

- a) you want to leave the company;
- b) you stay in the company but without much desire;
- c) you are happy with new acquaintances, actively in contact;
- d) you are pleased to meet new people, want to learn as much as possible about them and show yourself to the best.

15. If you write poems, stories, diaries, etc.:

- a) you do not share what you write with anyone;
- b) you sometimes share what you write with those you trust very much;
- c) you read what you write if you are asked to do;
- d) you actively read what you write because you are interested in knowing the opinion of others.

16. If you taste a new dish that you like:

- a) you eat with pleasure but do not express your opinion;
- b) you can praise but prefer to answer questions;
- c) you do not wait for a question and praise the dish yourself;
- d) you not only praise but also ask about the recipe.

17. Choose the best type of title for a story about a neighbours' quarrel:

- a) Quarrel;
- b) Neighbours' quarrel;
- c) Silly neighbours' quarrel;
- d) The story of how Ivan Ivanovich quarrelled with Ivan Nikiforovich.

18. How do you make a comment to one of your acquaintances that he is very talkative:

- a) you can hint to him about it because this shortcoming annoys you;
- b) you do not react very well to the chatter of others;
- c) you like to listen to others if it's interesting;
- d) you are talkative, and a similar feature of your friend makes it possible for you to express yourself?

19. When asked about the time in a situation when you do not have a watch, you will answer:

- a) I do not know;
- b) sorry, I don't have a wristwatch;
- c) I would gladly answer, but, unfortunately, I do not have a watch about me;
- d) I would be happy to answer your question, but now my wristwatch is in repair. I suffer from this, but what's to be done?

20. During a public report, if the topic interests you, and the lecturer expresses controversial or indisputable opinions:

- a) you would like to object but you don't;
- b) you would like to express your opinion, and you do not worry if you fail to do it;
- c) you object with a remark;
- d) you seek the opportunity to object to the speaker publicly.

21. You read a discussion article in a newspaper on a topic that worries you:

- a) you think that you could join the discussion but do not take up the article in response, gradually forgetting about your intention;
- b) you consider a possible article in response, write a plan, collect material and make a draft. But you are not upset if something prevents you from completing the case;
- c) you write an article and send it, but you do not take to heart the refusal to publish it;
- d) if you have got a refusal to publish your material, you will write to the editors again and send a new version.

22. Note the most important feature of your employees:

- a) extreme restraint;
- b) contact, aimed primarily at you;
- c) noticeable sociability;
- d) unlimited contact.

23. Evaluate yourself by choosing from the list below the dominant level of communication inherent in you:

- a) low;
- b) close to average;
- c) relatively high;
- d) high.



### Points for answers to questions

No.	Answer	Point	No.	Answer	Point
1			13		
2			14		
3			15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12					

*Key.* The answers to questions 1 – 22 have the following points:

a – 2; b – 4; c – 6; d – 8.

Sum up the points obtained in answers to questions 1 – 22.

If the number of points is 44 – 60, you must learn to communicate more actively. Otherwise, your introversion will hinder you and your environment in communication.

If the number of points is 61 – 100, you need to consciously increase activity in communication.

If the number of points is 101 – 150, you have a high communication activity, close to the classic extraversion.

If the number of points is more than 150, you must be more careful when communicating, restrain yourself and adjust your manner of communication to reduce its activity.

Question 23 helps you correctly assess the difference between your objective level of sociability and your assessment. For example, if your objective point is 70, and you choose in question 23 the answer "c", you need to trust the objective opinion more than your own.

## **The self-test questions**

1. Define the concept of social environment.
2. Define the concept of social macro-environment.
3. Define the concept of social micro-environment.
4. Define the concept of social dangers.
5. Give examples of social dangers.
6. Define the concept of global (international) safety.
7. Define the concept of social adaptation.
8. Define the concept of team.
9. Define the concept of socio-psychological climate of a team.
10. Give examples of different types of socio-psychological climate of a team.
11. Define the concept of conflict.
12. Define the concept of communication.
13. Give examples of different types of conflicts.

## **Theme 6. Risk. Risk analysis. Risk management**

### **Practice 10**

#### **Risk analysis. Risk classification. Risk assessment.**

#### **Risk management**

*The competences* are: the ability to assess the environment safety for humans, the collective and society, and carry out danger monitoring.

#### **10.1. Theory**

Human activity often negatively influences people themselves, leading to injuries, diseases, and sometimes to complete disability or death. Thus, any activity is potentially dangerous. Today, two main approaches are used to assess the dangers that affect humans: the axiom of absolute safety and the axiom of potential risk (Fig. 10.1) [9; 10].

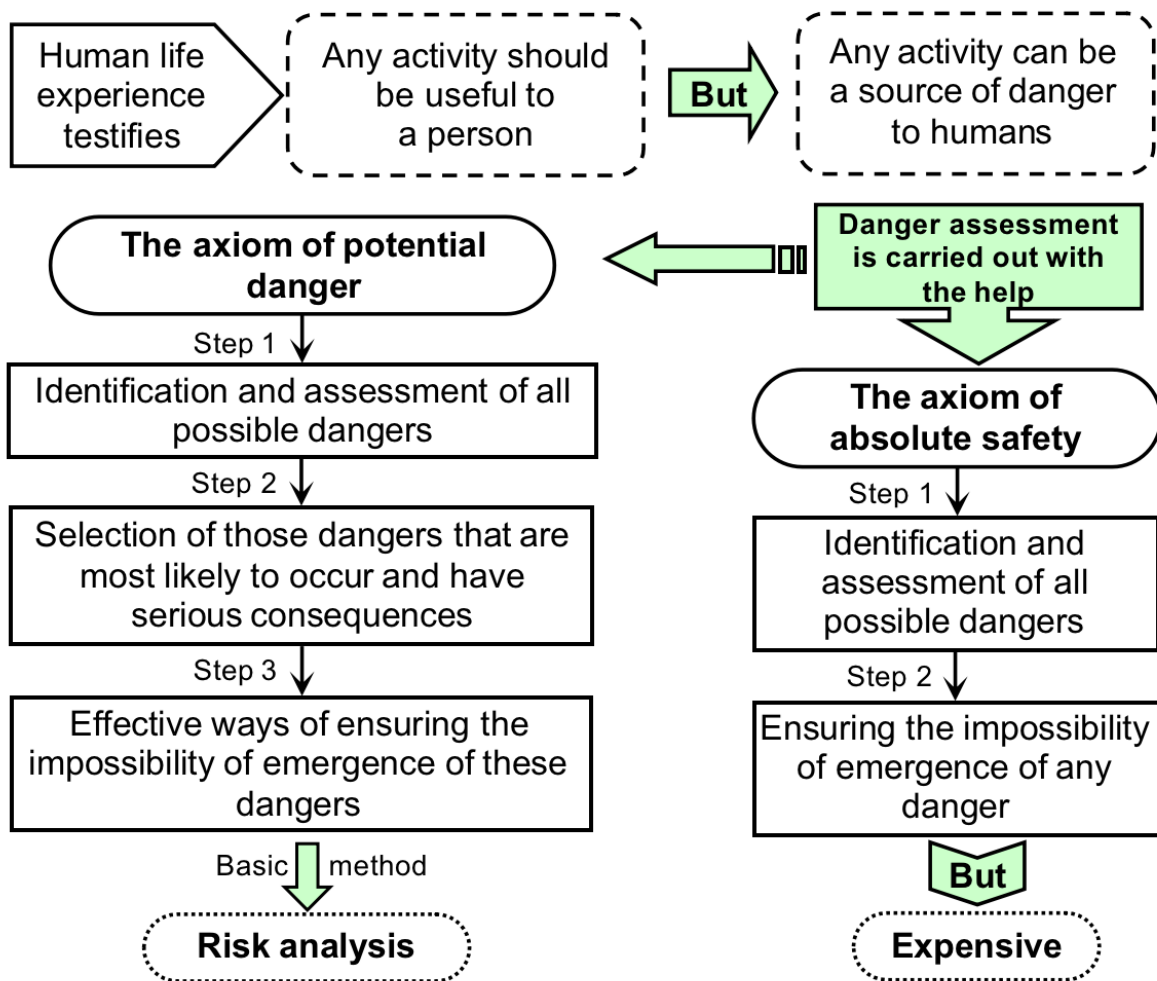


Fig. 10.1. **Axioms of the safety of vital activity**

The key tool of the axiom of potential danger is risk analysis.

*Risk analysis* is the systematic use of risk information, comparing it with acceptable values and justification of rational protection methods [5; 6].

*Risk* is a probability of danger emergence [5; 6].

Risk (R) is the ratio of the number of actual manifestations of danger (n) to the theoretically possible number of danger manifestations (N) for a certain period.

$$R = \frac{n}{N}, \quad (10.1)$$

where R is the risk of danger emergence for a certain period; n is the number of actual danger emergences for a certain period; N is the theoretically possible number of dangers for a certain period.

Relatively small (zero) risk indicates the absence of real dangers; and vice versa: the higher the risk, the greater the likelihood of adverse effects on humans.

The result of the risk assessment is obtaining a quantitative value. However, the question immediately arises: "How to interpret this meaning?". It was decided to introduce "a reference value". The comparison of the obtained value with the reference one indicates how much the danger can break human living conditions. However, the following question immediately arises: "What value should be taken as a reference one?". Based on the processing of a significant amount of data on various cases of negative impact on human life and health (transport catastrophes, industrial accidents, infectious diseases, natural disasters, etc.), the scale of their consequences for a country and society, scientists have concluded that as a reference value today the value of  $10^{-6}$  per year can be taken. This approach is called the "concept of acceptable risk" [11].

*The concept of acceptable risk* is such a low level of mortality, injury, or disability that does not affect the enterprise, industry or state's economic performance [5; 6; 11].

Acceptable risk combines technical, economic, social and political aspects and is a compromise between the level of safety and the possibilities to achieve it.

There are many risk features according to which they can be classified into individual types, for example, classifications on the scale of spreading, expediency, degree of acceptability, relation to the field of activity, frequency of exposure, etc. Consider some of them in greater detail (Fig. 10.2 – 10.4).

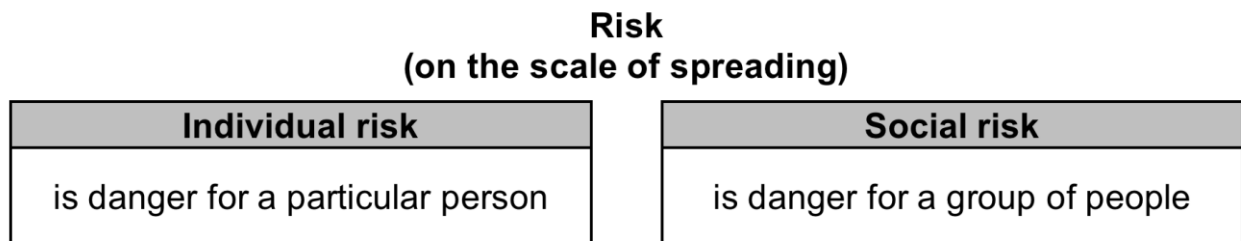
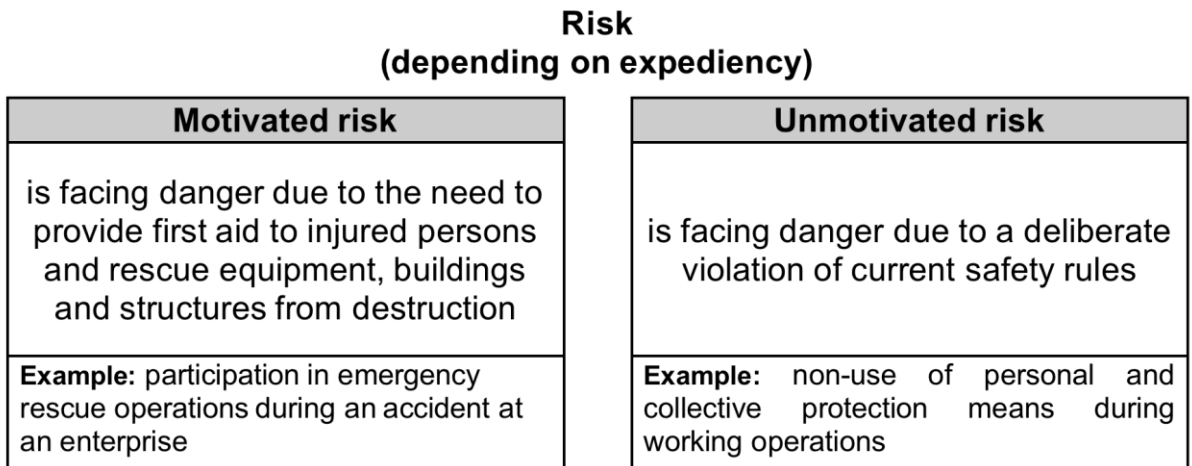
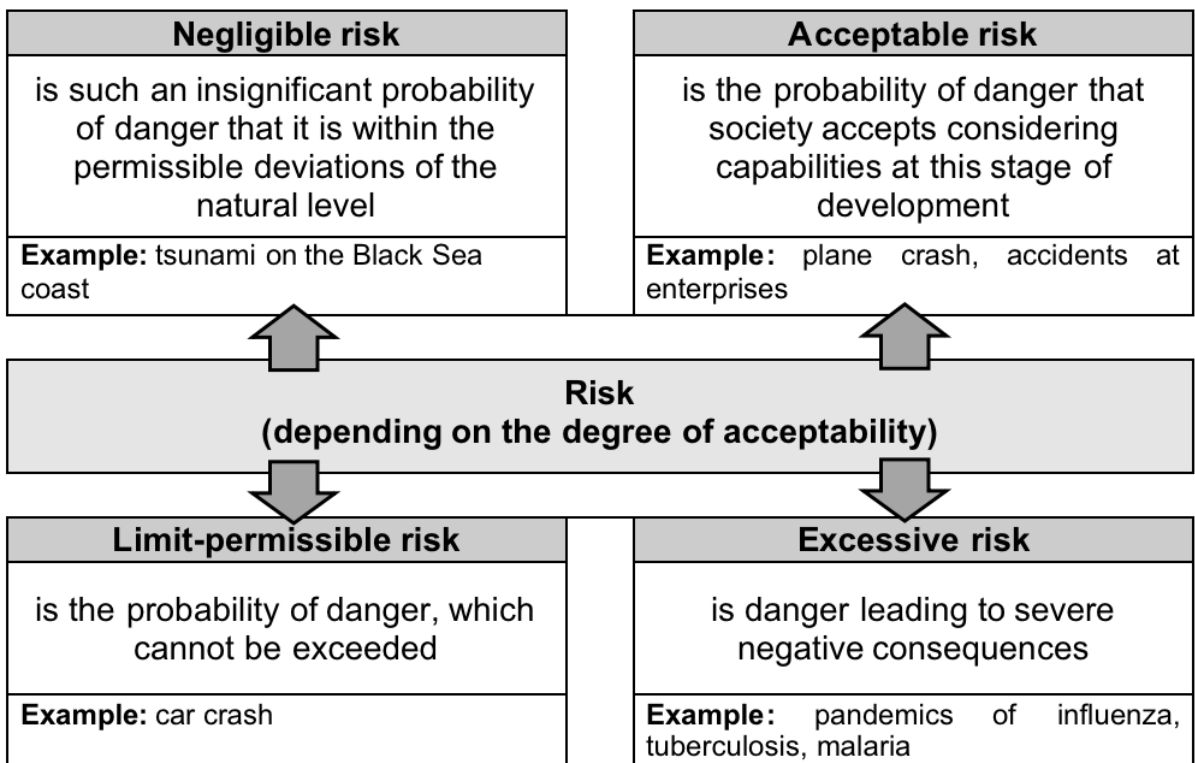


Fig. 10.2. Risk classification based on the scale of spreading



**Fig. 10.3. Risk classification depending on expediency**



**Fig. 10.4. Risk classification according to the degree of acceptability**

In practice, determining the risk of any danger is quite a challenge because it is necessary to consider the maximum amount of danger data to obtain an accurate assessment, which is not always possible. Therefore, there are methods for assessing the risk of danger, which simplify this task. Consider them in more detail [9; 10].

*The first method is engineering.* The method is based on statistical danger data, the calculations of their frequency and building a "fault tree".

There are two stages: qualitative and quantitative risk analysis.

The qualitative risk analysis is the identification of all possible dangers, determination of their qualitative characteristics and development of basic protective measures.

The quantitative risk analysis is choosing the most effective protection system from certain dangers.

Building a "fault tree" is used while doing quantitative analysis to determine the possibility of danger.

Building a "fault tree" provides accurate determination of the possibility of realisation of such danger.

*The second method is the model one.* The method is based on building models of danger influence on a person, social and professional groups.

An example of using the method is car crash testing. A test situation is artificially created. Analysis of the test results helps to timely determine the possible dangers, affecting humans during car exploitation and take necessary measures to increase safety level.

*The third method is an expert one.* According to this method, the possibility of different dangers is determined by experienced specialists in a specific field.

*The fourth method is sociological (sociometric assessment).* The method is based on a survey of a population or workers about their attitude to danger.

It should be noted, that the most accurate danger risk assessment can be obtained only upon a complex use of all these methods.

*Risk management* is the process of decision-making and taking measures aimed at providing the minimum possible risk.

Risk management aims to forecast danger emergence and take measures to prevent it.

Risk management consists of the following stages:

revealing and identifying the dangers which can lead to unwanted results;

risk analysis and assessment;

monitoring and forecasting danger emergence;

assessment of possible consequences of danger emergence;

development of measures and means for minimisation of danger.

Together risk management stages aim to create an effective action program which helps to implement safety-proving decisions.

## 10.2. Practice

**Assignment 1.** Assess the degree of readiness for risk using Schubert's quiz.

Instruction. The quiz offers 25 questions. Put the points in Table 10.1 for answers to the questions according to the following scheme:

2 points – completely agree;

1 point – rather "yes" than "no";

0 points – neither "yes" nor "no";

-1 point – "no" rather than "yes";

-2 points – disagree.

Sum up the total number of points for answers to the quiz questions.

### Quiz

1. Would you exceed the set speed to quickly provide medical care to a seriously ill person?

2. Would you agree to participate in a dangerous and long expedition for good earnings?

3. Would you stand in the way of a dangerous burglar?

4. Could you ride on the step of a freight car at a speed of more than 100 km/h?

5. Can you effectively work the day after a sleepless night?

6. Would you be the first to cross a cold river?

7. Would you lend a large sum of money to a friend, being not quite sure that he would be able to return the money to you?

8. Would you enter a lion cage with the tamer when he assures you that it would be safe?

9. Could you climb a tall factory pipe under outside guidance?

10. Could you operate a sailing boat without training?

11. Would you risk grabbing the bridle of a running horse?

12. Could you ride a bike after ten glasses of beer?

13. Could you make a parachute jump?

14. Could you, if necessary, travel without a ticket from Tallinn to Moscow?

15. Could you take a car tour if your acquaintance, who has recently had a car accident, would drive?

16. Could you jump from a height of 10 meters on the awning of the fire brigade?

17. Could you go to a life-threatening operation to get rid of an illness?
18. Could you jump off the step of a freight car moving at 50 km/h?
19. Could you, together with seven other people, take an elevator for only six people?
20. Could you go blindfolded through a busy street intersection for a big reward?
21. Would you take on a life-threatening job if you are paid well for it?
22. Could you calculate the percentage after ten glasses of alcoholic beverages?
23. Could you take a high-voltage wire if your boss assures you that the wire is de-energized?
24. Could you control a helicopter after some preliminary explanations?
25. Could you travel without money and food products but having a ticket from Kyiv to Stockholm?

Table 10.1

### Points

No.	Points	No.	Points	No.	Points	No.	Points	No.	Points
1		6		11		16		21	
2		7		12		17		22	
3		8		13		18		23	
4		9		14		19		24	
5		10		15		20		25	

*Key.* Interpretation of the obtained results:

if you have from -50 to -30 points, you are too careful;

if you have from -29 to +19 points, you can take a risk if you need it;

if you have from +19 to +50 points, you are very prone to risk.

**Assignment 2.** Assess motivation to protect yourself from danger using the Ehlers quiz.

Instruction. The quiz includes a list of 30 lines, three words per line (Table 10.2). Select one word out of the three in each line that most exactly describes you. Highlight the chosen word.



Table 10.2

### The Ehlers quiz

No.	Characteristic	Characteristic	Characteristic
1	bold	vigilant	adventurous
2	gentle	timid	stubborn
3	careful	decisive	pessimistic
4	volatile	offhand	attentive
5	unreasonable	cowardly	reckless
6	agile	brisk	prudent
7	cold-blooded	oscillating	dashing
8	rapid	frivolous	timid
9	unreasonable	prim	improvident
10	optimistic	conscientious	sensitive
11	melancholic	having doubts	unstable
12	cowardly	careless	excited
13	imprudent	quiet	timid
14	attentive	unreasonable	bold
15	prudent	fast	courageous
16	adventurous	careful	prudent
17	excited	dispersed	timid
18	cowardly	unwary	offhand
19	shy	indecisive	nervous
20	executive	devoted	adventurous
21	prudent	brisk	desperate
22	calm	indifferent	careless
23	careful	carefree	patient
24	clever	caring	brave
25	prudent	fearless	conscientious
26	hasty	shy	carefree
27	dispersed	imprudent	pessimistic
28	cautious	prudent	enterprising
29	quiet	disorganized	timid
30	optimistic	vigilant	carefree

*Key.* You get 1 point for the following selected word options (Table 10.3). Other options of words do not give you points. Sum up the points.

Table 10.3

## Key for the Ehlers quiz

No.	1	2	3
1		+	
2	+	+	
3	+		+
4			+
5		+	
6			+
7		+	+
8			+
9	+	+	
10		+	
11	+	+	
12	+		+
13		+	+
14	+		
15	+		
16		+	+
17			+
18	+		
19	+	+	
20	+	+	
21	+		
22	+		
23			+
24	+	+	
25	+		
26		+	
27			+
28	+	+	
29	+		+
30		+	

*Interpretation:*

from 2 to 10 points, you have a low motivation to protect yourself from danger;

from 11 to 16 points, you have an average motivation level to protect yourself from danger;

from 17 to 20 points, you have a high motivation level to protect yourself from danger;

more than 20 points, you have a high motivation level to protect yourself from danger.

### **The self-test questions**

1. Describe the axiom of potential danger.
2. Describe the axiom of absolute safety.
3. Define the concept of risk analysis.
4. Define the concept of risk.
5. Define the concept of acceptable risk.
6. Give explanation of risk classification on the scale of spreading.
7. Give explanation of risk classification based on expediency.
8. Give explanation of risk classification according to the degree of acceptability.
9. Describe the engineering method for assessing the risk of danger.
10. Describe the model method for assessing the risk of danger.
11. Describe the expert method for assessing the risk of danger.
12. Describe the sociological method for assessing the risk of danger.

## **Theme 7. Labour protection issues.**

### **Legal and organisational bases of labour protection**

#### **Practice 11**

#### **Labour protection**

*The competences* are: studying the basic concepts of labour protection.

**Assignment.** Study theoretical issues on the topic. Prepare answers to the following questions.

#### **Questions for discussion**

1. The current state of labour protection in Ukraine and abroad.
2. Legislation of Ukraine on labour protection.

3. Responsibility of officials and employees for violations of labour protection legislation.
4. Occupational safety financing.
5. The state management system of labour protection in Ukraine.
6. Structure, functions and tasks of labour protection management in an organisation.

## **Theme 8. Physiology and occupational health**

### **Practice 12**

#### **Physiology and occupational health**

*The competences* are: the ability to assess the safety of technological processes and equipment and justify measures to improve it.

##### **12.1. Theory**

Lighting is a necessary environmental factor for humans. Light through the autonomic nervous system affects the functions of all human systems and organs [4; 12]. Limiting or depriving a person of natural light can lead to a pathological condition such as light starvation. The consequence of this can be functional disorders in the activity of the central nervous system, vitamin deficiency, a decrease in the intensity of metabolism, weakening of the protective immunobiological reactions of the body, etc.

Light is not only a necessary component for the normal functioning of the human body; it is also a factor that provides visual perception of information about the environment. The essential flow of information (about 80 %) from the outside world enters the human brain directly via the visual analyser.

Lighting, depending on the light source, can be natural, artificial and combined [4; 12].

*Natural lighting* is the illumination of premises with light from the sky (direct or reflected) penetrating through light apertures in external enclosing structures.

Natural lighting has diffuseness, which is favourable for visual working conditions. However, on the other hand, natural light creates illumination that varies widely depending on the time of day, season, weather conditions, etc.

*Artificial lighting* is indoor lighting created by artificial light sources.

Such lighting is available in the premises, where there is not enough natural light or for lighting at night. Appropriate illumination of the working surface provides favourable conditions for the work of the visual analyser.

*Combined lighting* is necessary to supplement insufficient natural lighting with artificial ones in accordance with the lighting norms.

*Poor-quality lighting* of premises not only complicates but, in some cases, makes it impossible to carry out work operations, reduces productivity and quality of work and can cause occupational diseases and accidents. The analysis of injuries shows that 20 – 25 % of accidents at work are associated with inadequate lighting.

*Too bright lighting* blinds, disrupts visual functions and leads to over-excitation of the nervous system and decreased performance. Exposure to excessively bright light (for instance, the sun or electric arcs) can cause burns, inflammation of the cornea of the eyes, cataracts (clouding of the lens), and other disorders.

*Micro-climate* is the meteorological conditions of the internal environment of premises determined by the combinations of temperature, relative humidity, air velocity, and the intensity of thermal radiation from heated surfaces affecting humans [4; 11; 12].

In the process of labour activity, a person is in constant thermal interaction with the environment. The human thermal state is formed by two processes – heat generation (or chemical thermoregulation) and heat loss (or physical thermoregulation).

Stable changes in human health conditions are possible as prolonged stay in unfavourable micro-climatic conditions. For instance, disruption of the cardiovascular system, suppression of the nervous system, impaired water-salt metabolism, decreased immunity and general resistance of the body to harmful environmental factors, etc.

*Noise* is a set of sounds of varying intensity and frequency that adversely affect human health and interfere with work and rest [4; 11; 12].

*Sound* is elastic waves that spread in gases, liquids and solids and are perceived by the human auditory analyser [4; 11; 12].

Although sounds affect the human auditory analyser, not all of them cause auditory sensations. Therefore, sounds are divided into two ranges: audible and inaudible (Fig. 12.1) [11].

The minimum amount of sound energy (sound pressure) that can be transformed into a nervous process and cause sensation is called the threshold of hearing.

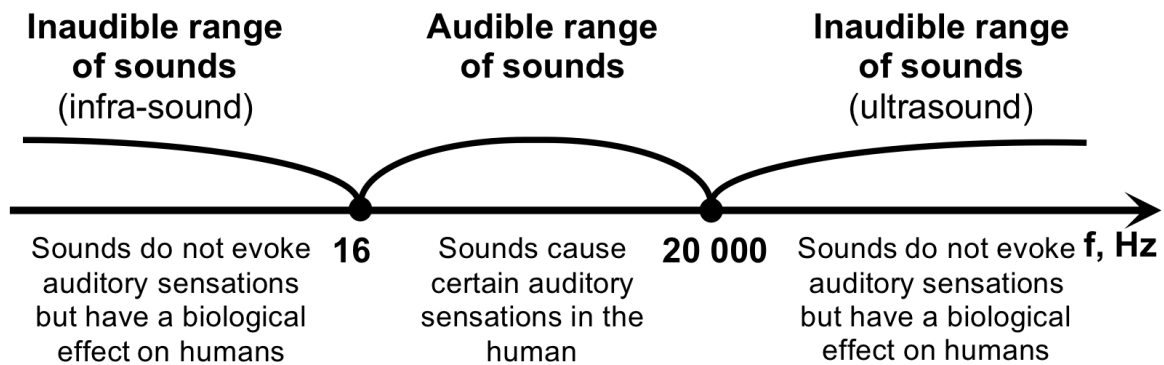


Fig. 12.1. **Classification of sounds on the scale of frequency**

The severity of the noise harmful effects on humans increases with a growth in the intensity and duration of influence. In addition, systematic exposure to noise with sound pressure levels of about 100 dB contributes to visual problems, headaches, and insomnia. 145 dB sound pressure levels or more can cause mechanical damage in the auditory analyser, for example, rupture of the tympanic membrane.

*Vibration* is mechanical fluctuations in elastic bodies or oscillatory movements of mechanical systems that arise as the action of a periodically changing force.

Depending on the way of impact on an individual, vibration is divided into two types (Fig. 12.2) [11].

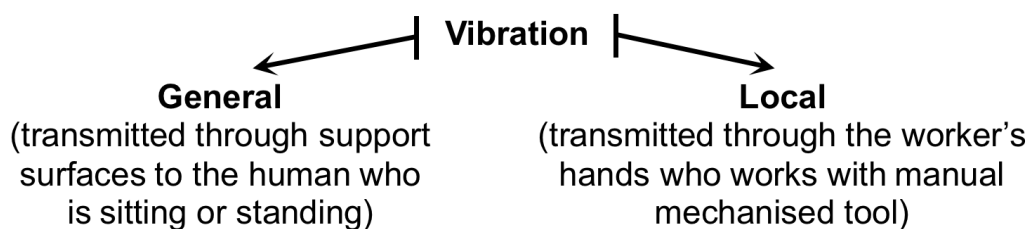


Fig. 12.2. **Classification of vibration depending on the way of impact on an individual**

Vibration is a factor that has high biological activity. The character of human reactions to vibration is conditioned by the force of the energy impact and the biomechanical properties of the human as a complex oscillatory system. The negative consequences of vibration depend on the way of its transfer to the human body (Fig. 12.3) [11].

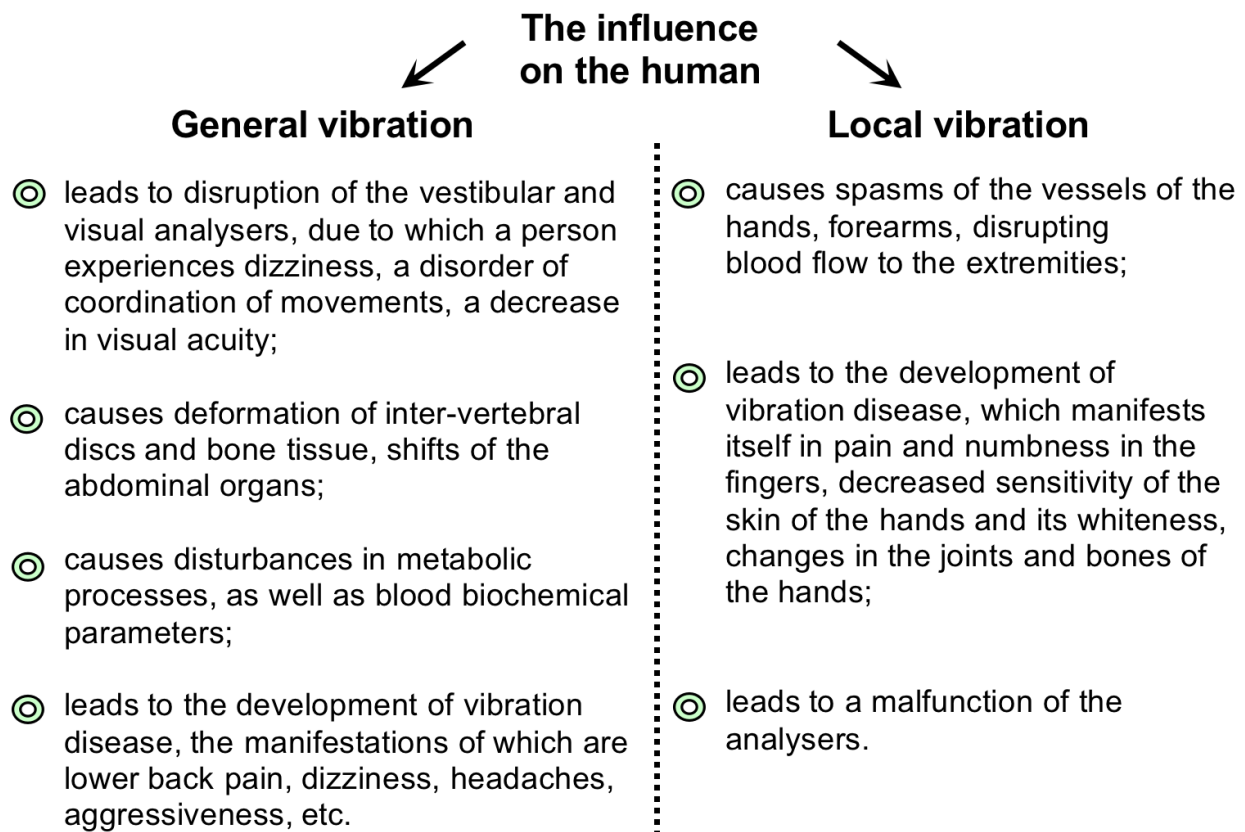


Fig. 12.3. **The influence of vibration on a human**

The factors of the working environment that increase the harmful effects of vibrations on the human body include excessive muscular loads, unfavourable climatic conditions, high-intensity noise, etc.

### 12.2. Practice

**Assignment 1.** Study the effect of lighting on humans. Determine the possible harmful effects of lighting on humans. Write down your answers in Table 12.1.

Table 12.1

#### Lighting influence on humans

Working conditions	Adverse effects on human health
Low lighting	
Bright lighting	

**Assignment 2.** Study the effect of micro-climate on humans. Determine the possible harmful effects of micro-climate on humans. Write down your answers in Table 12.2.

Table 12.2

### Micro-climate influence on humans

Working conditions	Adverse effects on human health
High air temperatures	
Low air temperatures	
High humidity	
Low humidity	
High air velocity	
Low air velocity	

**Assignment 3.** Study the effect of noise on humans. Determine the possible harmful effects of noise on humans. Write down your answers in Table 12.3.

Table 12.3

### Noise influence on humans

Negative effects of noise on human health	Manifestation of negative consequences
Specific lesions of the hearing organ	
Disorders of organs and systems	

**Assignment 4.** Study the effect of vibration on humans. Determine the possible harmful effects of vibration on humans. Write down your answers in Table 12.4.

Table 12.4

### Vibration influence on humans

Working conditions	Adverse effects on human health
The influence of general vibration	
The influence of local vibration	



## The self-test questions

1. Define the concept of natural lighting.
2. Define the concept of artificial lighting.
3. Define the concept of combined lighting.
4. Describe the negative consequences of working in poor lighting conditions.
5. Describe the negative consequences of working in bright lighting conditions.
6. Define the concept of micro-climate.
7. Describe the negative consequences of working in poor micro-climate conditions.
8. Define the concept of noise.
9. Define the concept of sound.
10. Give the classification of sounds based on frequency.
11. Describe the negative consequences of working in noisy conditions.
12. Define the concept of vibration.
13. Give the classification of vibration depending on the way of impact on an individual.
14. Describe the negative consequences of working in vibration conditions.

## Theme 9. Workplace safety

### Practice 13

#### Work place safety

*The competences* are: the ability to assess the safety of technological processes and equipment and justify measures to improve it.

#### 13.1. Theory

*Ergonomics* (from the Greek *ergon* meaning work + *nomos*, i.e. law) is a scientific discipline that comprehensively studies (in terms of psychology, physiology, occupational health and other sciences) a human in the specific conditions of his activities related to the use of technical means [10; 11].

*Ergonomic effectiveness* is a complex of system properties that provide the possibility of dynamic human interaction with technical means to achieve the goal in the given operating conditions [10; 11].

## 13.2. Practice

**Assignment.** Do an ergonomic assessment of the workplace that is in Fig. 13.1 and in Table 13.1.

Instruction. Use the data presented in Fig. 13.1, in Table 13.1. The normative values are given in Table 13.2. Select the characteristics of the workplace and describe them quantitatively using two parameters  $\alpha$  and  $\beta$ :

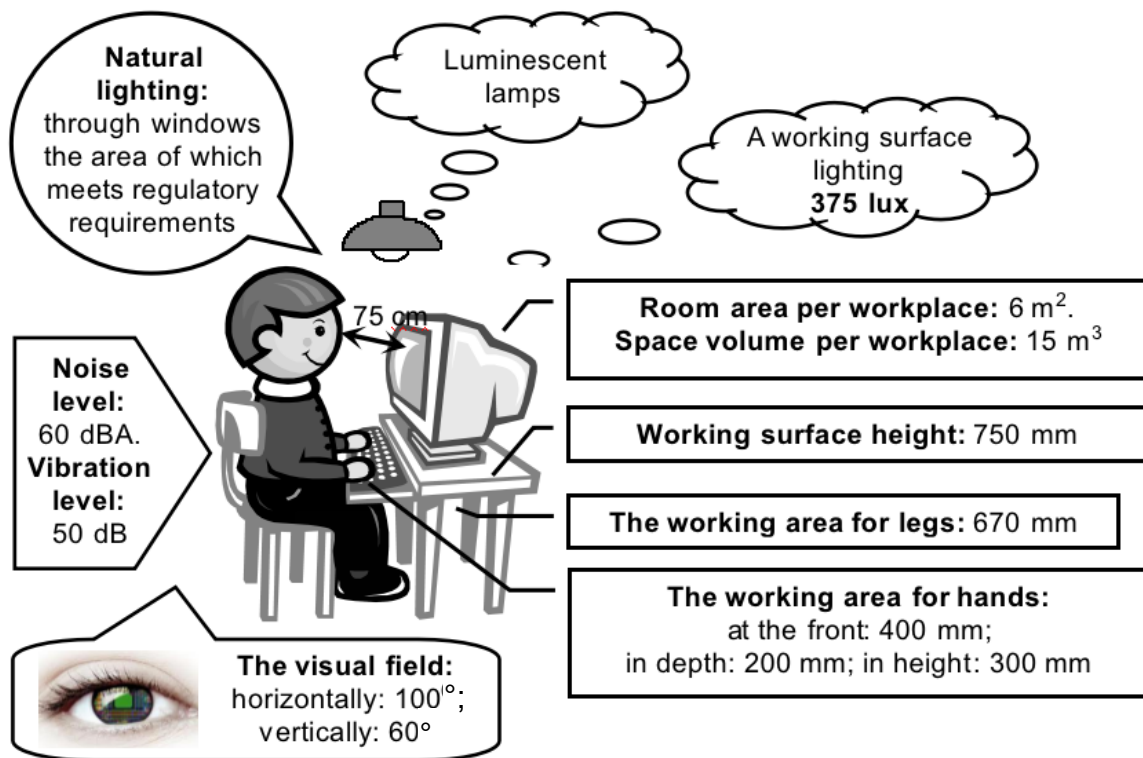
$\alpha$  is the point of the indicator, measured in points from 1 to 5. The parameter  $\alpha$  is given to the characteristic on the basis that 0 is the negative option and 5 is the desirable one (for example, if the lighting is low, then  $\alpha = 1$ ; if it is bad,  $\alpha = 2$ ; if it is satisfactory,  $\alpha = 3$ ; if it is good,  $\alpha = 4$ ; if it is excellent,  $\alpha = 5$ );

$\beta$  is the specific weight of the indicator. It is set depending on the value of the particular indicator for the evaluated system and taken as a percentage. The parameter  $\beta$  is given so that the total specific weight of all selected characteristics of the workplace is equal to 100 %. In this case, the highest percentage is assigned to the indicator that is most important for this type of activity (for example, for quality work, the important indicator is the size of the work area, and less important is the use of circular concentric scales, in this case,  $\beta_1 = 10 \%$ , and  $\beta_2 = 1 \%$  respectively).

Sum up the work results in Table 13.2. Then, make a general workplace ergonomic assessment according to the formula:

$$\gamma = \sum \frac{\alpha_n \times \beta_n}{100}. \quad (13.1)$$

The value of  $\gamma$  should be within [0 ... 5]. If the obtained score of  $\gamma$  is low, suggest ways to optimize the workplace so as to improve performance and thus get higher points.



**The employee's body position at work:** straight.

**The angle of the work chair back:**

forward: 5°; back: 5°.

**Work chair characteristics:**

- 1) chair corresponds to the employee's anthropometric characteristics;
- 2) chair has no regulatory mechanisms;
- 3) chair height is 450 mm;
- 4) the width and depth of a working seat surface are 450 mm.



**Regulated breaks for rest:** workday with no fixed hours, breaks are unstable.

**Psychoemotional stress:** constant (there is no possibility to alternation of actions).

**Physical stress:** none.

**The monotony of activity:** constant (there is no possibility of alternation of actions).

Fig. 13.1. Working place

Table 13.1

### The workplace particular characteristics

No.	Characteristic	Characteristic indicator
1	2	3
1	The aesthetic room decoration	bright colour
2	Condition of technical devices	operating

Table 13.1 (the end)

1	2	3
3	Micro-climate parameters	1) air temperature: cold time of year $t = 20^{\circ}\text{C}$ ; warm time of year $t = 28^{\circ}\text{C}$ ; 2) relative humidity: 25 %; 3) air speed: 0.5 m/s.
4	Electromagnetic fields and radiation	1) electric field strength: 30 V/m; 2) magnetic flux density: 230 nT.
5	Availability of the means of individual and collective protection	there is no necessity
6	Lasting of work shift	10 hours
7	Timeliness of workplace safety briefings	once every six months
8	Socio-psychological climate in the team	positive, comfortable for the employee
9	Career opportunities	absent
10	Hazardous chemicals in the workplace	no
11	Availability of alarms and rescue equipment	the alarm system is available and corresponds to the category of the room
12	Ways of movement, availability of exits in case of need of evacuation	They are available and have special guide marks

Table 13.2

### A workplace ergonomic assessment

Type of employee activity (economist, engineer, PC operator, etc.)				
No.	Characteristic	Normative requirements (for computer-related jobs)	$\alpha$ , points	$\beta$ , %
1	2	3	4	5
1	Room area per one workplace	6 m <sup>2</sup>		
2	Room volume per one workplace	20 m <sup>3</sup>		
3	Aesthetics condition of the room (colour, materials used to decorate the room, etc.)	pastel tones		
4	Condition of technical devices	operating		

Table 13.2 (continuation)

1	2	3	4	5
5	Micro-climate parameters	Air temperature: cold time of year: 22 – 24°C, warm time of year: 23 – 25°C. Relative humidity: 40 – 60 %. Air speed: 0.1... 0.3 m/s.		
6	Natural lighting in the workplace	required		
7	General artificial lighting in the room (lamp type)	required (luminescent lamps)		
8	Local artificial lighting in the workplace (lamp type)	required (luminescent lamps)		
9	The level of work surface illumination	350 lux		
10	Noise in the workplace	should not exceed 110 dBA		
11	Vibration in the workplace	70 dB (for administrative premises)		
12	Electromagnetic fields and radiation	electric field strength: up to 25 V/m; magnetic flux density: up to 250 nT.		
13	Availability of the means of individual and collective protection	required, according to activity type		
14	The distance from the employee to the monitor	700 ... 750 mm		
15	The visual field	horizontally: 180°. vertically: 180°		
16	The working area for hands	at the front, in depth and height: 1 m		
17	The working area for legs	in the depth: 1 m		
18	Working surface height	680 – 800 mm		
19	The height of the working chair and the possibility of adjustment	400 – 550 mm with the possibility of adjustment		
20	The width and depth of the working seat surface	not less than 400 mm		
21	The angle of the work chair back	150° forward, 50° back		
22	The employee's body position at work and the ability to change it	straight or inclined (tilt angle: 100°)		

Table 13.2 (the end)

1	2	3	4	5
23	Physical stress	at least two 15-minute breaks during the work shift		
24	Psychoemotional stress	if possible, changing the activity to one that is not related to the use of a computer; at least two 15-minute breaks during the work shift		
25	The monotony of activity	if possible, changing the activity to one that is not related to the use of a computer		
26	Lasting of work shift	8 hours		
27	Regulated breaks for rest	meal break 20 – 45 minutes; additional short breaks during the work shift: 2 (15 minutes each)		
28	Timeliness of workplace safety briefings	once every six months		
29	Socio-psychological climate in the team	–		
30	Career opportunities	–		
31	Hazardous chemicals in the workplace	control of the content of carbon dioxide, ozone, ammonia, phenol and formaldehyde in the working air		
32	Availability of alarms and rescue equipment	required, according to the premises category		
33	Ways of movement, availability of exits in case of need of evacuation	required, according to the premises category		

### The self-test questions

1. Define the concept of ergonomics.
2. Define the concept of ergonomic effectiveness.
3. Describe the indicator  $\alpha$ .
4. Describe the indicator  $\beta$ .
5. Describe the indicator  $\gamma$ .

## Theme 10. Fire safety

### Practice 14

### Fire safety

*The competences are:* studying basic concepts of fire safety.

**Assignment.** Study theoretical issues on the topic. Prepare answers to the following questions.

#### Questions for discussion

1. Indicators of explosive properties of materials and substances.
2. Categories of premises for explosion and fire risk.
3. Classification of explosive and flammable premises and areas.
4. Means and measures to ensure the fire safety of the premises.
5. Fire alarm and its types.
6. Fire extinguishers and their classification.
7. Ensuring and controlling the state of fire safety in working premises.
8. The work of state fire supervision.
9. Organisation of fire protection of enterprises.

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НАВЧАЛЬНЕ ВИДАННЯ

Протасенко Ольга Федорівна

**ПРАКТИКУМ З ТРЕНІНГ-КУРСУ  
"БЕЗПЕКА ЖИТТЄДІЯЛЬНОСТІ  
ТА ОХОРОНА ПРАЦІ"**

**Навчальний посібник  
(англ. мовою)**

*Самостійне електронне текстове мережеве видання*

Відповідальний за видання *О. Ю. Давидова*

Відповідальний редактор *О. С. Вяткіна*

Редактор *З. В. Зобова*

Коректор *З. В. Зобова*

Подано основні теоретичні відомості, опис практичних завдань, методичні рекомендації до їх виконання, матеріал щодо закріплення знань, основні типові завдання за темами тренінг-курсу.

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