Ministry of Public Health of Ukraine
Kharkov National Medical University

Hygiene and Ecology

Workbook
for students of medical faculty

Module 1
General problems of hygiene and ecology

Student_____
Year of training _____
Group_____

CONTENTS

LIST OF COMPULSORY PRACTICAL SKILLS FOR STUDENTS

№	Name of practical skill	Date of its working up	Mark	Signature of the teacher
1.	**Carrying out the physical, chemical and bacteriological measuring of environmental objects**			
2.	**Determining the ultraviolet radiation intensity by biological and photochemical methods**			
3.	**Determining indices of natural lighting and artificial illumination of premises using luxmeter**			
4.	**Measuring the temperature parameters, the absolute and relative air humidity the air movement speed in premises**			
5.	**Determining the radiant temperature, equivalent-effective and resultant temperature**			
6.	**Sampling the air for determination of the microbial, dust, chemical pollution by sedimentation and aspiration methods using laboratory analyses. Calculation the indices of ventilation**			
7.	**Measuring noise and vibration level using the noise-and-vibration complex, noise dosimeter and noise spectrum analyses**			
8.	**Carrying out sanitary inspection of living conditions**			
9.	**Sampling the water during the selection of the water supply and drinking water sources**			
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12.	**Assessment the drinking water quality using results of laboratory analysis**			
13.	**Determining presence of the organic pollution in drinking water**			
14.	**Sampling the soil for physical and chemical indices determination, chemical, bacteriological, helminthological analyses**			
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17.	**Determining the capillary resistance using Matussis or Nesterov manometer. Carrying out the test with Tilmans reagent**			
18.	**Assessment the food products quality using organoleptic methods, sample them for laboratory analysis**			
19.	**Determining the type of food poisoning and its cause**			
20.	**Performing the act of food poisoning investigation**			
21.	**Mastering the main methods of sanitary and chemical analysis of air in the work area**			
22.	**Carrying out instrumental and laboratory research of the physical factors of air in the work area**			
23.	**Determining the toxic substances content in the air using universal gas analyzer UG-2**			
24.	**Carrying out somatoscopic, somatometric, physiometric, neuropsychological researches of the children's and adolescents' physical development**			
25.	**Mastering methods of complex assessment of the children's and adolescents' physical development**			
26.	**Mastering the methods of hygienic assessment of school plot and building, the school premises and furniture**			
27.	**Mastering methods of assessment of school time-table and pupils' day regimen**			

INTRODUCTION TO HYGIENE AND ECOLOGY

Date_____

Subject 1. INTRODUCTORY LESSON. RESEARCH METHODS USED IN HYGIENE

Learning objective

- To master the knowledge about the hygiene as a science and sanitation, their goals, tasks, components, significance of hygienic knowledge for doctors of different profile.
- To learn the classification of hygienic methods of the research of the environment and its influence on organism and health.

Basics

You should know:

- A concept of «prophylaxis» as one of the basics of medicine, hygiene and sanitation as its components.
- Basic concepts, methods and research facilities from physics, chemistry, biology, microbiology, physiology and other preceding courses which are used in research of environmental factors and their influence on human health.
- Basics of the mathematical processing of medico-biological research results.

You should have the following skills:

- The physical, chemical and bacteriological measuring of environmental objects and their influence on an organism.
- Using the computers or calculators during the statistical processing of the results of hygienic researches.

#	Name of the methods	Essence of the method	Objects of research
1	2	3	4
1. Methods of studying the objects of the environment			
1.1.	The organoleptic methods		
1.2.	The physical methods		
1.3.	The chemical methods		

1	2	3	4
1.4.	The physical-chemical methods		
1.5.	The biochemical methods		
1.6.	The microscopic methods		
1.7.	Microbiological methods		
1.7.1.	The bacteriologi-cal methods		
1.7.2.	The mycological methods		
1.7.3.	The serological methods		
1.7.4.	The helmintho-logical methods		

2. Methods of studying the responses of the organism			
1	2	3	4
2.1.	The physio-logical methods		
2.2.	The psycho-logical methods		
2.3.	The biochemical methods		
2.4.	The toxico-logical methods		
2.5.	Experimental methods		
2.5.1.	The natural experiment		
2.5.2.	The laboratory experiment		
2.5.3.	The chamber experiment		

3. Separate methods			
3.1.	The epidemiolo-gical methods		
3.2.	The sanitary and statistical methods		
3.3.	The method of sanitary inspection		

Test questions

1. Classification of methods used in hygiene.
2. Methods of studying the objects of the environment, their essence.
3. Methods of studying the organism responses, their essence.
4. The epidemiological methods used in hygiene.
5. Experimental methods, their kinds.
6. Sanitary-statistical methods used in hygiene.
7. The method of sanitary inspection and description of the object of sanitary supervision.

Signature of the Teacher_____ Signature of the Student _____

HYGIENE OF THE AIR ENVIRONMENT

Date _____

Subject 2. METHODS OF DETERMINATION OF ULTRA-VIOLET RADIATION INTENSITY AND ITS PROPHYLACTIC DOSE USAGE OF THE ULTRAVIOLET RADIATION FOR THE DISEASE PREVENTION AND AIR SANATION

Learning objective

- To become familiar with physical and biological characteristics of ultraviolet radiation (UVR).
- To master the measuring methods of the ultraviolet radiation intensity.
- To master the measures of the ultraviolet radiation intensity and the calculations of the exposure to it using different measuring methods.

Basics

You should know:

- The nature, the physical characteristics and the spectral distribution of solar radiation.
- The physical characteristics, the spectral distribution and the biological effect of UVR.
- The dosimetric units and measuring methods of the UVR.

You should have the following skills:

- Working with ultravioletmeter (UV-meter) according to its manual.
- Using the mathematical methods of the UVR intensity and dose assessment.

1. Hygienic character of solar radiation.

1.1. _____
_____

1.2. _____
_____

1.3. _____
_____

2. Hygienic character of UV radiation.

2.1._____
_____

2.2._____
_____

2.3. _____
_____

3. Measurement of UV radiation.

3.1. Devises for measurement_____
_____

3.2. Place of measurement _____
_____

3.3. Results of measurement_____
_____

4. The erythemal dose of UV radiation and the method of its determination
D_{er}_____
_____
_____
_____
_____
_____

5. The physiological dose of UV radiation $D_{ph} = \frac{D_{er}}{2} =$

6. Determination of prophylactic dose of UV radiation by the formula

$$D_{pr} = \left(\frac{B}{C}\right)^2 \cdot \frac{1}{8} D_{er} =$$

where B is distance between patient and source of UV irradiation,
C is standard distance for determining D_{er} (50 cm)

7. Artificial sources of UV radiation_____
_____
_____
_____

8. Schemes of prophylactic irradiation for children and adults by the artificial sources of UV radiation_____
_____
_____
_____
_____
_____
_____
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_____
_____

Test questions

1. Hygienic characteristics of solar radiation.
2. Hygienic characteristics of UV radiation.
3. Diseases connected with insufficiency of UV radiation and their prophylaxis.
4. Diseases connected with surplus of UV radiation and their prophylaxis.
5. The methods of measuring of UV radiation. Measurement devices.
6. Erythemal, physiological and prophylactic doses of UV radiation.
7. The method of determination of erythemal dose of UV radiation with the help of Gorbachov's biodosimeter.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 3. METHODS OF DETERMINATION AND HYGIENIC ASSESSMENT OF NATURAL LIGHTING AND ARTIFICIAL ILLUMINATION IN DIFFERENT PREMISES

Learning objective

- To learn the hygienic requirements for natural lighting in different premises.
- To master the geometrical, lighting engineering methods of natural lighting indices determination, to learn how to assess the results of instrumental measuring, and to draw a hygienic conclusion about natural lighting in differing premises.
- To learn the role and the meaning of the rational artificial illumination as the means of lengthening the activity period of people, and disease and fatigue prevention.
- To master the methods of the measurement and hygienic assessment of artificial illumination in different premises with the help of a luxmeter and calculation methods.

Basics

You should know:

- Physical characteristics and hygienic significance of natural lighting, tasks and criteria of its assessment considering the type of visual work and functions of the premises.
- External and internal factors that natural lighting level of the premises depends on.
- Basic physiological functions of the visual analyzer (visual acuity, contrast sensitivity etc). Vision as an integral function of visual analyzer.
- Main harmful effects of insufficient and excessive lighting on human health and work capacity. The influence of lighting on the myopia development.
- Measuring methods and indices of the natural lighting.
- Physical basis of illumination, concepts and measurement units for light.
- Physiological functions of the visual analyzer, their dependence on illuminance.
- Hygienic requirements and significance of artificial illumination in different premises.
- Types of artificial illumination and their comparison (advantages and disadvantages).
- Factors that influence the level of artificial illumination.
- Methods of artificial illumination assessment and the principles of its hygienic regulation.

You should have the following skills:

- To determine and assess the geometrical indices of natural lighting in different premises.
- To measure and assess the lighting using a luxmeter, the daylight factor (DF) determination and their hygienic assessment.
- To assess the regimen of premises insolation
- To measure the illuminance and brightness, and other indices using instrumental and calculating methods.
- To give a comprehensive hygienic assessment of the artificial illumination of the premises and workplaces, considering the type of visual work and premises' function.
- To draw the motivated conclusions and make recommendations concerning the optimization of the artificial illumination

Estimation of natural lighting

1. The geometrical method

1.1. Devices for measurement_____

1.2. Determination of the light coefficient (LC)

1.2.1. Characteristics of the windows in the room:

number of windows_____

their face_____

shape of the windows_____

height_____

width_____

the area of one window _____

the area of all windows _____

the area of the glazed surface of the windows _____

1.2.2. The length of the floor in the room _____

the width of the floor in the room _____

the area of the floor _____

$$LC = \frac{area\ of\ \ glazed\ \ windows}{area\ \ of\ \ floor} =$$

1.3.Determination of the angle of incidence (Fig. 1)

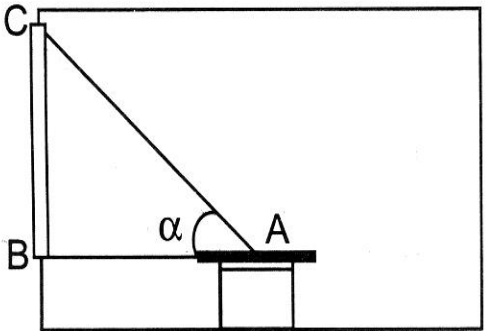


Fig. 1

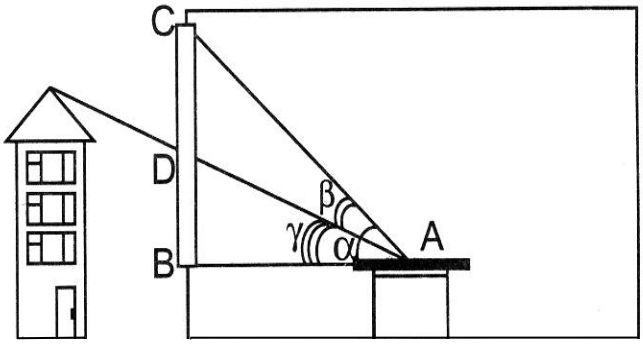


Fig. 2

AB is the distance from the working place to the lower line of the window _____

BC is the height of the window _____

$\frac{BC}{AB}$ is tg of angle α _____

angle α by the table is _____

1.4. Determination of the angle of opening (Fig. 2)

BD is distance between the line on the window glass from the opposite subject and the lower line of window _____

$\frac{BD}{AB}$ is tg of angle γ _____

- angle γ (by the table)= _____
- angle of opening β= angle α - angle γ _____

2. The technical lighting method

2.1 Determination of the coefficient of natural illumination (daylight factor)

E_1 is natural illumination inside (in luxes) on the working place_____

E_2 is natural illumination outside (in luxes)_____

$$CNI = \frac{E_1}{E_2} \cdot 100\%$$

3. Conclusion _____

_____

_____

_____

_____

Estimation of artificial lighting

1.Devices for measuring the artificial lighting _____
2. Measurement of the artificial lighting:
2.1. Measurement of the artificial lighting with help of the objective luxmeter
2.1.1. during the hours of darkness (without natural lighting) _____
2.1.2. in the conditions when windows are hidden with the help of dark blinds in the day time _____
2.2. The "Watts" calculated method:
2.2.1. the kind of sources of artificial lighting in the room _____
2.2.2. the number of sources of artificial lighting in the room_____
2.2.3. the power of one lamp _____
2.2.4. the area of the floor in the class-room _____
- the length of the floor _____
- the width of the floor _____
2.3.Calculation of the artificial lighting by the formula

$$E = \frac{P \cdot n \cdot 10}{S \cdot K} =$$

where
E is artificial lighting in the room (in luxes)
P is the power of one lamp
n is the number of lamps
S is the area of the floor in the room
K is the coefficient of stand-by (1.3)
10 is recalculation of Watts into luxes (1 watt is equal 10 luxes)
3. Conclusion_____
_____
_____

Test questions

1. Hygienic requirements to natural lighting.
2. Factors which influence the natural lighting.
3. The natural lighting determination methods.
4. Light coefficient and the method of its determination.
5. The angle of incidence, hygienic standard and the method of its determination.
6. The angle of opening, hygienic standards and the method of its determination.
7. The coefficient of natural illumination, method of its determination, hygienic standards for different rooms.
8. Hygienic requirements to artificial lighting.
9. Sources of artificial lighting and their hygienic characteristics.
10. Systems of artificial lighting.
11. Methods of measurement of artificial lighting.
12. Rate setting of artificial lighting for different rooms.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject **4. THE METHODS OF DETERMINING THE TEMPERATURE, HUMIDITY AND THE AIR MOVEMENT DIRECTION AND VELOCITY INDOORS AND THEIR HYGIENIC ASSESSMENT**

Learning objective

- To substantiate the hygienic significance of microclimate for different premises (residential, public/social, industrial) and to master the measurement and hygienic assessment of its following parameters: air temperature, radiant temperature, relative humidity, air velocity.
- To master, complement and systematize the students' knowledge about the hygienic significance of the atmospheric and indoor air movement direction and speed as the microclimate factor in residential, public and industrial premises.
- To master the methods of determination and hygienic assessment of the air movement direction and speed.

Basics

You should know:

- Definition of «microclimate» and factors, which influence its formation.
- Physiological basics of human heat exchange and thermoregulation, their dependence on the microclimate: physiological reactions in the comfortable or uncomfortable (hot or cold) microclimate.
- Hygienic significance of the atmospheric and indoor air, its role in the microclimate formation and mechanisms of the organism heat exchange.
- Methods and devices for determination of the air movement direction and speed outdoors and indoors.

You should have the following skills:

- To measure the indoor air temperature, radiant temperature, air humidity and to assess the temperature and humidity conditions of different premises (residential, public/social, industrial).
- To determine the air movement direction and speed, wind strength.
- To draw the hygienic conclusions and to assess the results of the outdoor and indoor air movement direction and speed measurement

1. Measurement of the air temperature in the class-room:

1.1. Devices which are used for the measurement_____

_____

1.2. The place of carrying out the measurement_____

1.3. Points and results of the measurements along the horizontal and vertical line

t_1(h=1.5m) = _____°C

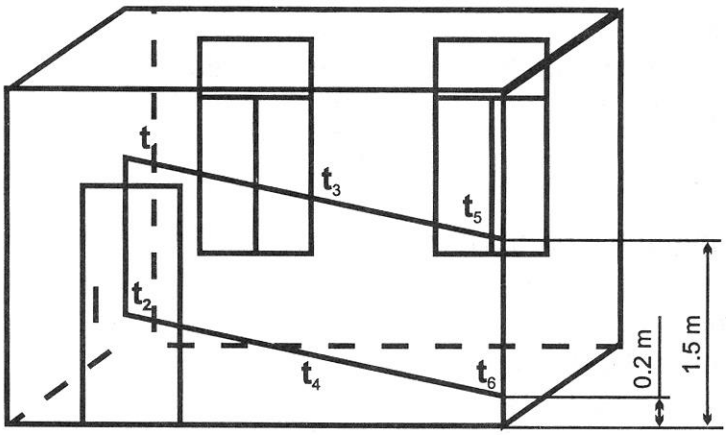
t_2(h=0.2m) = _____°C

t_3(h=1.5m) = _____°C

t_4(h=0.2m) = _____°C

t_5(h=1.5m) = _____°C

t_6(h=0.2m) = _____°C



1.4. Calculation of the average temperature:

Total $\sum t6$ =

$$T_{av.} = \frac{\sum t6}{n} =$$

1.5. Calculation of the temperature differences.

- on the vertical line

$$t_v = \frac{t_1 + t_3 + t_5}{3} - \frac{t_2 + t_4 + t_6}{3} =$$

- on the horizontal line

$$t_h = \frac{t_5 + t_6}{2} - \frac{t_1 + t_2}{2} =$$

2. The measurement of the air humidity.

2.1. Devices which are used for the measurement of air humidity_____

_____

2.2. Place of carrying out the measurement_____

2.3. The measurement of the relative humidity:

2.3.1. with the help of the hygrometer: R = %

2.3.2. with the help of the psychrometer by the table:

- reading of the "dry" thermometer $t_{d.t.}$ = °C
- reading of the "wet" thermometer $t_{w.t.}$ = °C
- result by the table R = %

3. Conclusion _____

_____

_____

_____

4. The measurement of atmospheric pressure

4.1. The devices for the measurement_____

4.2. The place of carrying out the measurement_____

4.3. The result of the measurement _____

4.4. Conclusion_____

_____

_____

5. The measurement of air velocity outdoors

5.1. The devices for the measurement_____

_____

5.2.The place of carrying out the measurements_____

5.3.The course of the work: _____

_____

_____

_____

_____

_____

Indices of anemometer: before the measurement _____

after the measurement _____

the time of the measurement _____

Calculation the anemometer rotations number per second _____

_____

5.4. Determining the air movement velocity by the graph _____

6. Measurement of the air movement velocity indoors.
6.1. The devices for the measurement_____
6.2. The place of carrying out the measurement_____
6.3. The course of the work:_____
_____
_____
_____
t is the time when the alcohol falls down from 38° to 35° C _____
F is the factor of catathermometer _____
Q_1 is the average temperature of catathermometer _____
Q_2 is the air temperature in the room _____
H is cooling ability of air

$H = \frac{F}{t} =$

$Q = Q_1 - Q_2 =$

6.4. Determining of velocity of air movement V

6.4.1. by the table $\frac{H}{Q}$ = _____; V = _____

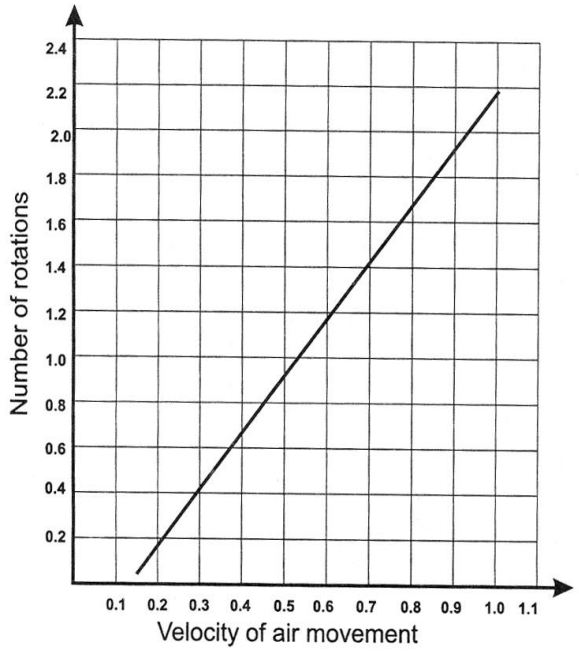
6.4.2. by the formula

$V = \left(\frac{\frac{H}{Q} - 0{,}20}{0{,}40} \right)^2 =$ _____ for the air movement less than l m/s

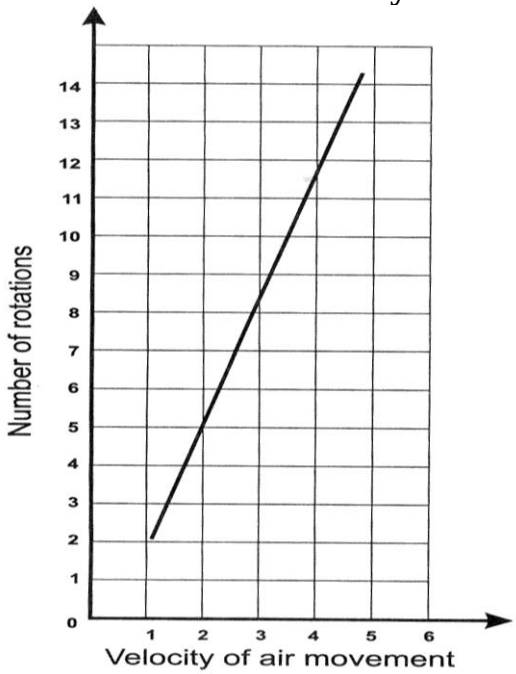
$V = \left(\frac{\frac{H}{Q} - 0{,}13}{0{,}47} \right)^2 =$ _____ for the air movement more than l m/s

6.5. Conclusion_____
_____

Graph for determining the air movement velocity



from 0.3 to 1 m/s



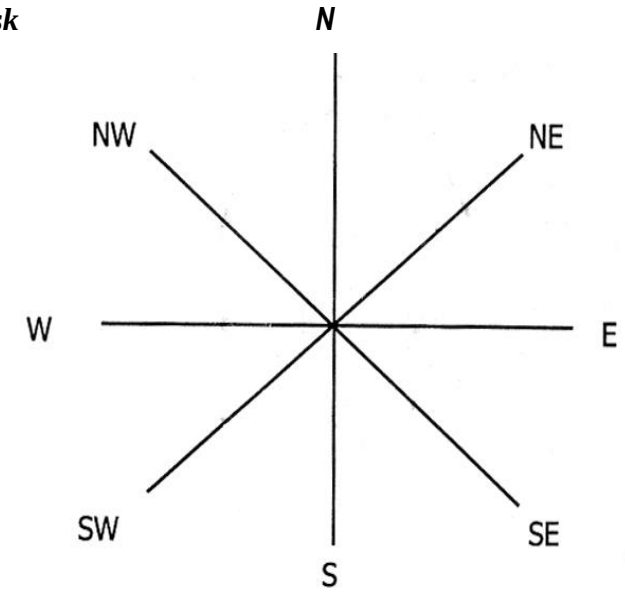
from 1 to 5 m/s

7. Hygienic estimation of the air movement direction

Situational task

In the given place the wind blows over the year:
North wind was blowing for 90 days,
North-West wind was blowing for 45 days,
West wind was blowing for 30 days,
South-West wind was blowing for 40 days,
South wind was blowing for 30 days,
South -East wind was blowing for 30 days,
East wind was blowing for 30 days,
North-East wind was blowing for 45 days,
Days without wind - 25.

Draw the "wind-rose"
S: l cm corresponds to 20 days



Answer the following questions:
1.What wind direction prevails in this place?
2.Where must living zone be built?
3.Where must industrial enterprises be built?

Conclusion_____
_____
_____
_____
_____

Test questions

1. The mechanism of thermoregulation in the human organism and ways of heat transfer.
2. Influence and prophylaxis of high and low temperature of the environment on the human organism.
3. The rules for measuring air temperature indoors.
4. Influence of high and low temperature with high humidity on the human organism.
5. Prophylaxis of low and high humidity affects on the human organism.
6. The kinds of air humidity.
7. The method of measuring absolute and relative air humidity.
8. Physiological and hygienic significance of atmospheric pressure.
9. Low and high atmospheric pressure, its influence on the human organism.
10. The method of measurement of atmospheric pressure. Devices for its measurement.
11. Physiological and hygienic significance of air movement.
12. The method of measurement of air velocity outdoors. Devices for its measurement.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 5. METHODS OF HYGIENIC ESTIMATION OF COMPLEX INFLUENCE OF THE MICROCLIMATE ON THE HUMAN HEAT EXCHANGE

Learning objective

- To master the methods of the hygienic assessment of the effects of microclimate on human heat exchange using subjective and objective physiological parameters.
- To master the objective methods of assessment of the effects of microclimate on human heat exchange using the effective (ET), the equivalent-effective (EET), resultant temperatures (RT)' nomograms, the catathermometer method and the organism heat balance calculation.

Basics

You should know:

- Main thermodynamical and physiological principles of human heat-exchange and thermoregulation (at the basic level of biophysics, biochemistry and physiology knowledge).
- Hygienic significance of microclimate in different types of premises, its variants and characteristics.
- Influence of comfortable and uncomfortable (hot and cold) microclimate on human body.
- Subjective and objective characteristics of the organism heat balance.

You should have the following skills:

- To measure and assess the microclimate characteristics (air temperature, radiant temperature, air humidity and air movement).
- To measure and assess the influence of the microclimate on physiological parameters of the organism heat exchange and thermoregulation (respiratory rate, heartbeat rate, blood pressure, body and skin temperature, sweating intensity, skin electroconductivity), to evaluate the subjective temperature sensation of the patient, using his physiological and psychoemotion al reactions.

Situational tasks

Task # 1

The indoor air temperature is 25^0C according to the dry thermometer and 19^0C according to the wet thermometer of the Assman`s psychrometer, the indoor air movement is 1 m/sec. Determine the indoor equivalent-effective temperature and make a conclusion about the organism heat balance.

_____

_____

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_____

_____

Task # 2

The indoor air temperature is 30^0C according to the dry thermometer of the Assman`s psychrometer, indoor air movement is 0.8 m/sec, the absolute humidity is 12 Hg mm, the average radiant temperature is 25^0C. A man works physically hard. Determine the indoor resultant temperature and make a conclusion about the organism heat balance.

_____

_____

_____

_____

_____

Task # 3

Give the hygienic estimation of the microclimate in a class-room:

- the average temperature is 22°C,
- the difference of the temperature on a vertical is 5.5°C, on a horizontal is 2°C,
- reading of the dry thermometer of the psychrometer is 21 °C,
- reading of the wet thermometer is 18°C;
- the period of time when the alcohol falls down in the catathermometer from 38°C to 35°C is 128 seconds,
- the factor of the catathermometer (F) is 615.

Task #4

Give the hygienic estimation of the microclimate in a secondary school gym:

- the average temperature is 19°C, the difference of the temperature on a vertical is 2°C, on a horizontal is 3.5°C;
- the reading of the dry thermometer of the psychrometer is 20°C, the reading of the wet thermometer is 12°C;
- the period of time when alcohol falls down in the catathermometer from 38°C to 35°C is l min 42sec,
- the factor of the catathermometer (F) is 615.

Task #5

Give the hygienic estimation of the microclimate of a therapeutic ward for adults. It is characterized by the following parameters:

- the average temperature is 24°C,
- the temperature difference on a vertical is 3°C, the temperature difference on horizontal is 1.5°C;
- reading of the dry thermometer of the Assman's psychrometer is 24°C,
- reading of the wet thermometer is 17°C;
- the period of time when alcohol falls down in a catathermometer from 38 °C to 35°C is 133 seconds,
- the factor of the catathermometer (F) is 615.

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Test questions

1. The factors, forming the microclimate.
2. Kinds of the microclimate.
3. Physiological principles of the heat exchange in the human being and its connection to the microclimate of the environment.
4. Complex influence of physical factors of the atmospheric air on the heat exchange in the human being.
5. The cooling microclimate and its influence on the human organism. Meteorological conditions that cause the cooling.
6. The heating microclimate and its influence on the human organism. Conditions that cause the heating.
7. General methods of hygienic study and estimation of the microclimate in the rooms. Norms of the temperature, humidity and velocity of air movement in dwellings, hospital rooms, class-rooms, and so on.
8. The assessment methods of the indoor microclimate influence on humans: the catathermometer method, the methods of effective, equivalent-effective, resultant temperature nomograms, their comparative hygienic characteristics.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 6. METHODS OF HYGIENIC ESTIMATION OF AIR CONDITIONING AND VENTILATION OF ROOMS

Learning objective

- To get familiar with the factors and indicators of air pollution for indoor residence and manufacture areas.
- To master the methods of hygienic assessment of the air purity and efficiency of the indoor ventilation.

Basics

You should know:

- Physiological and hygienic significance of the air components and their influence on the human health and sanitary conditions.
- Sources and indicators of communal, domestic, public and industrial air pollution, their hygienic regulations.
- Indoor air circulation. Types and classification of the indoor ventilation, main parameters of the ventilation efficiency.

You should have the following skills:

- Determining of the carbon dioxide concentration in the air and assessment of the indoor air purity.
- Calculating of the required and actual volume and rate of the indoor ventilation.

1. Determination of carbon dioxide in the air:

1.1.The method of determination of carbon dioxide in the air_____
_____

1.2.The principle of the method_____
_____
_____
_____
_____

1.3.Chemical reaction_____
_____
_____

1.4.Chemical reagents and laboratory utensils_____
_____
_____
_____

1.5.The course of work

1.5.1. Air sampling for the experiment_____
_____
_____
_____

1.5.2. Reduction of the air volume under study to the normal conditions by the formula

$$V_{760}^{0} = \frac{V^{t}}{(1+\alpha t)} \cdot \frac{B}{760} =$$

The air temperature _____

The atmospheric pressure_____

1.5.3. Absorption of carbon dioxide from the tested volume of air by $Na_2 C0_3$

_____

_____

1.5.4.Determination of secondary titer of Na_2C0_3 (after absorption)_____

_____

_____

_____

1.5.5.Determination of primary titer of Na_2C0_3 (before absorption)_____

_____

_____

1.6.Calculation of the amount of carbon dioxide in the tested air by the formula

$$X = \frac{(V_1 - V_2) \cdot 0.044 \cdot 0.508 \cdot 1000}{V_0 - 10} =$$

1.7.Conclusion_____

_____

_____

2. Hygienic estimation of ventilation of rooms

2.1.Measurement of the volume of the class-room:

the length of the class-room (l)_____

the width of the class-room (w)_____

the height of the class-room (h)_____

$V_1 = l \cdot w \cdot h =$

2.2.The number of students in the class-room (n) _____

2.3.Measurement of the ventilation volume (V_2) by the formula

$$V_2 = \frac{22,6 \cdot n}{1 - 0,3} =$$

where:

22.6 $1/m^3$ is the amount of carbon dioxide one man exhales in one hour,

1 ‰ is the permissible level of carbon dioxide in the class-room,

0.3 ‰ is the amount of carbon dioxide in the atmosphere

2.4. Measurement of the air movement ratio in the class-room by the formula

$$K = \frac{V_2}{V_1} =$$

where K is the air movement ratio,

V_1 is volume of the class-room,

V_2 is volume of air ventilation.

2.5. Conclusion_____

_____

_____

_____

_____

_____

3. Solution of the situational tasks_____

Test questions

1. Physiological, hygienic and pathologic significance of carbon dioxide.
2. Sources of carbon dioxide in the air.
3. Sampling of carbon dioxide for analysis.
4. The method of carbon dioxide determination in the air.
5. Hygienic standards of carbon dioxide in the air of different rooms.
6. The volume of ventilation and the method of its determination.
7. The air movement ratio in the room and the method of its determination.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 7. METHODS OF HYGIENIC ESTIMATION OF NOISE AND VIBRATION

Learning objective

- To strengthen and enlarge theoretical knowledge of students about noise and vibration as elements of industrial environment and their influence on organism and health.
- To master techniques and means of measurement and hygienic assessment of noise and vibration parameters

Basics

You should know:

- Fundamentals of anatomy and physiology of auditory analyzer.
- Physical fundamentals of acoustics and vibration.
- Classification and fundamentals of noise and vibration source.
- Biological effect of noise and vibration, and prevention of their negative influence on human organism.

You should have the following skills:

- Using noise dosimeter and noise and vibration spectrum analyzer.
- Detecting the threshold of audibility using an audiometer.

1. Hygienic estimation of noise.

1.1. The device for noise measurement _____

_____

1.2.Place for the measurement_____

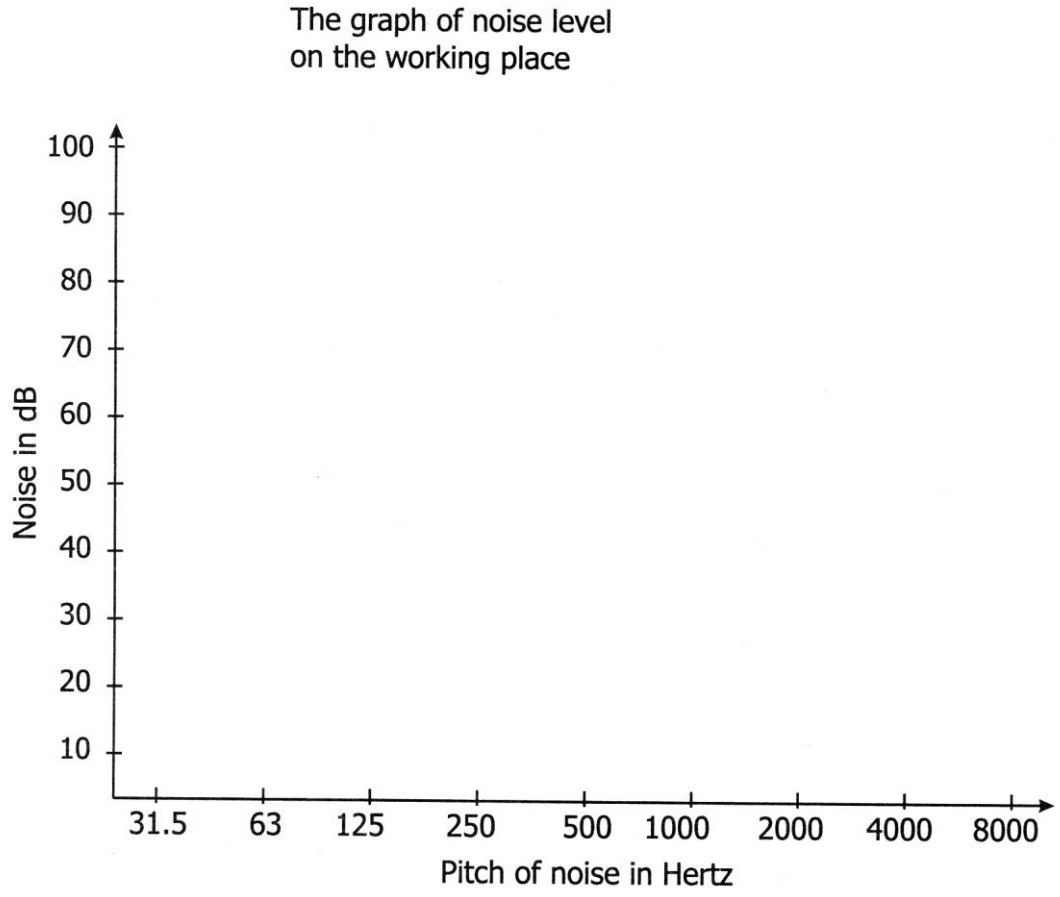
1.3.Result of the measurement

Pitch of noise (in Hertz)	31.5	63	125	250	500	1000	2000	4000	8000	General level of noise
Level of noise on the working place										

1.4.The permissible levels of noise on working places:

Pitch of noise (in Hertz)	31.5	63	125	250	500	1000	2000	4000	8000	General level of noise
Working places of mental workers	86	71	61	54	49	45	42	40	38	50
Working places of people doing physical work	107	95	87	82	78	75	73	71	69	80

1.5.Draw the graph of the on-site noise level



1.6 Make up a hygienic conclusion about the on-site noise level

_____
_____
_____
_____
_____

2.Estimation of vibration.

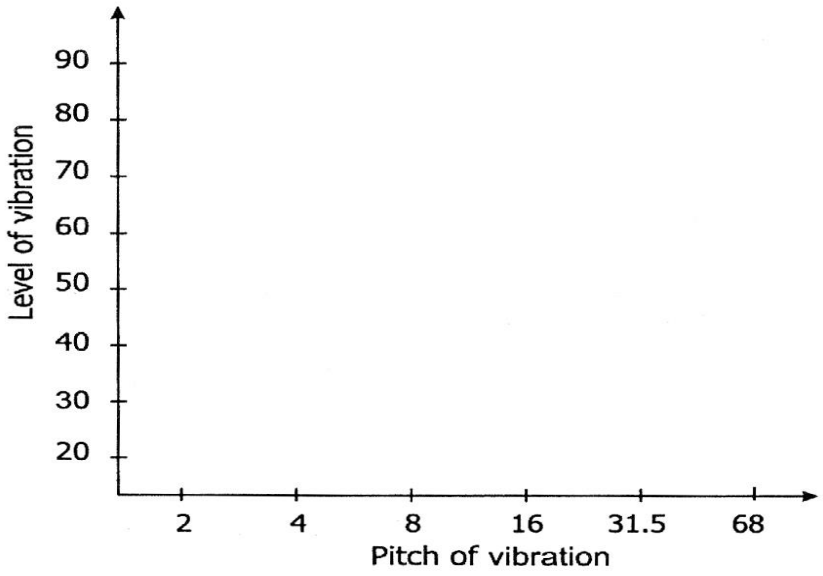
2.1. The device for vibration measurement _____

Situational task

The underground is placed at the distance of 25 m from foundation of the building. The results of measurement of vibration on the ground floor in the building are:

Pitch of vibration in Hertz	2	4	8	16	31.5	68
General vibration on the ground floor in dB	86	79	69	70	67	65
Hygienic standard of vibration by vibrospeed in dB	79	73	61	61	67	67

2.5 Graph of the vibration on the ground floor



2.6. Conclusion_____
_____
_____
_____
_____
_____

Test questions

1.Physical characteristics of noise.
2.Sources of noise.
3.Classification of noise.
4.Influence of noise on the human body.
5.The method and the devices for measurement of noise.
6.Prophylaxis of negative influence of noise on the human body.
7.Vibration and its physical character.
8.Classification of vibration.
9.Sources of vibration.
10.Negative effect of vibration on the human body and its prophylaxis.
11.The devices and the methods for vibration measurement.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 8. THE METHOD OF HYGIENIC ESTIMATION OF LIVING CONDITIONS IN A FLAT AND A HOSTEL

Learning objective

- To master the knowledge about the forms and methods of sanitary inspection, the visual inspection of the object, object exploitation elements, the usage of the organoleptic research methods and description

Basics

You should know:

- Hygienic requirements to placement, internal design and hygienic regime of a flat and a hostel.

You should have the following skills:

- Carrying out sanitary inspection of a flat and a hostel,
- Performing the act of sanitary inspection with a conclusion.

Act of sanitary inspection of a flat

1. Address of the flat
1.1. Flat #_____
1.2. House #_____
1.3. Street_____
2. The number of floors in the building _____
3. Material of the building _____
_____
4. The neighboring buildings and a distance to them_____
_____
_____
5. A distance to the road_____
6. Sources of air pollution and distance to them_____
_____
_____
7. Green plantations_____
_____
8. At what floor this flat is placed _____
9. Who lives in this flat_____
10. The number of rooms_____
11. Names of rooms and their orientation and area _____
_____
_____
12. The total area of the flat_____
13. The useful area_____
14. The living space for one person _____
15. The volume counted for one person _____
16. Remodelling of the flat _____
17. Dampness in the flat and its reasons _____
(present or absent)
18. Isolation of the flat from noise_____
(good or not good)

18.1. Sources of noise_____
_____
19. Floors in different rooms_____
_____
_____
20. Materials and condition of the windows and doors_____
_____
_____
21. Microclimate in different rooms

	Air temperature	Air humidity
1. Living-room		
2. Corridor		
3. Bath-room		
4. Kitchen		
5. Bedroom		

22. Natural lighting in the flat

Name of the room	Area of the floor	Number of windows	Length of windows	Width of windows	Area of one window	Area of all windows	Glass area of all windows	Light coefficient
Living-room								
Bedroom								
Kitchen								
Corridor								

23.Artificial lighting_____
23.1. Sources of artificial lighting_____
_____
_____
23.2. Amount of artificial lighting (by the calculated method «Watts»)_____
_____
_____
_____
24. Ventilation of different rooms_____
_____
25. Heating system_____
26. Water supply_____
26.1. Cold water supply _____
26.2. Hot water supply _____
27. Place for laundry _____
_____
28. Sewage system_____
_____
29. The diseases that the persons living in this flat have _____
_____

30. Conclusion_____
_____
_____
_____
_____

Act of sanitary inspection of a hostel

1. Address_____
2. Territory_____
3. Park _____
4. Yard _____
5. Surrounding objects and distance to them_____
_____
_____

5.1. Industrial enterprises_____
5.2. Dusty and noisy roads_____
5.3. Other sources of air pollution _____
_____
_____

6. How many people can live in the hostel_____
7. How many people live at present_____
8. Who lives in this hostel_____
9. How many of them living alone_____
10. Distance from the hostel to the work (study) place_____
11. Ways of transport_____
12. Time taken for the way to/from the work (study) place _____
13. The hostel occupies (number of buildings, stories and others_____
_____
_____
_____

14. Internal design _____

14.1.Bedroom: face_____
length_____width_____
area of the floor _____ counted for one person_____
light coefficient_____
artificial lighting _____

14.2.The study room
face_____
length_____width_____
area of the floor _____ counted for one person_____
light coefficient_____
artificial lighting_____

15. The kitchen for individual cooking _____
15.1. The refrigerator_____
16. Area of physical training _____
_____
_____

17. Recreation and reading room _____
_____
18. Bath-room and shower-stalls_____
_____
18.1. After how many days bed sheets are changed_____
19. Club_____
20. Assembly room _____
21. Store-room_____
22. Toilets_____
23.Heating of the hostel _____
23.1.System_____
23.2 Air temperature_____
24. Water supply_____
24.1.Sewers _____
24.2.Boiler_____
24.3.Supply of boiled water_____
24.4. Boiled water storage_____
25. Ventilation of premises_____
25.1.Natural ventilation_____
25.2.Cross ventilation is possible or not_____
26. Additional information_____
_____
_____
_____
_____
_____

Conclusion_____
_____
_____
_____
_____
_____

Test questions

1.Hygienic requirements to the placement of the housing in the city.
2.Hygienic requirements to the construction of flats and hostels.
3.Peculiarities of internal design of flats and hostels.
4.Hygienic requirements to microclimate and illumination in a flat and hostels; hygienic standards of this parameters.
5.Hygienic character of the heating system in the housing unit.
6.Hygienic character of water supply and sewage system in the housing unit.
7.Noise in the housing unit, its sources and methods of protection from noise.
6.Reasons of dampness in the housing unit and its prophylaxis.

Signature of the Teacher_____ Signature of the Student _____

HYGIENE OF WATER AND WATER SUPPLY

Date_____

Subject 9. THE METHOD OF SANITARY-TOPOGRAPHICAL INSPECTION OF WATER SUPPLY SOURCES AND SAMPLING OF WATER FOR BACTERIOLOGICAL AND SANITARY -CHEMICAL ANALYSIS

Learning objective

- To master the technique of sanitary inspection of water supply sources and water sampling for bacteriological and sanitary-and-chemical analysis.

Basics

You should know:

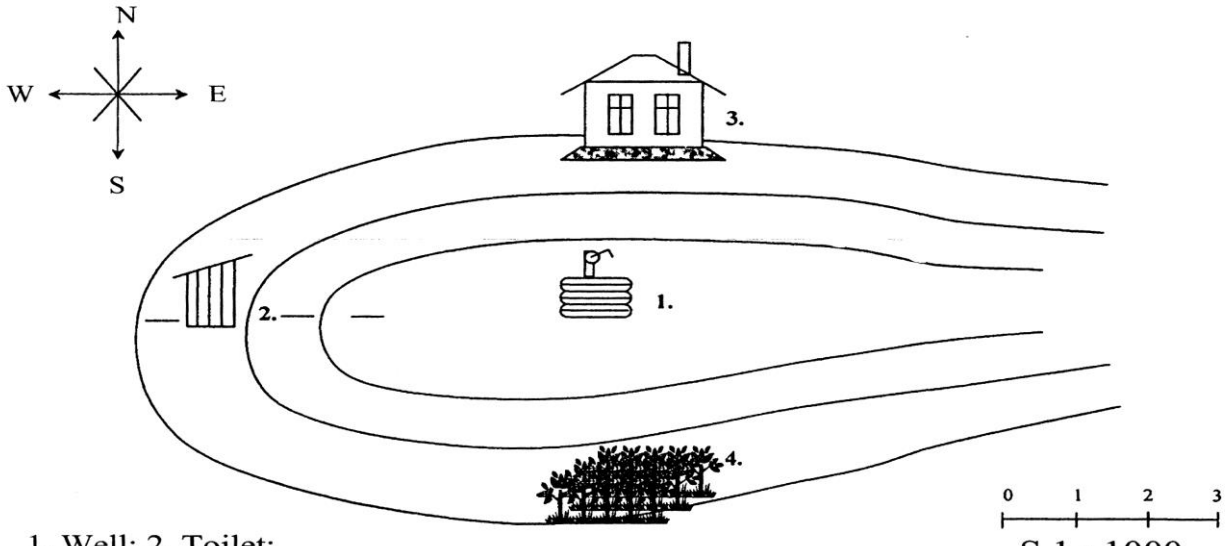
- Hygienic significance of water (physiologic, endemic, epidemiological, toxicological, balneal, climate and weather-forming, economical and domestic, pertaining to national economy).
- Classification of water supply sources and their hygienic characteristics.
- Programme of sanitary inspection of water supply sources: sanitary-and-topographic, sanitary-and-technical, sanitary-and-epidemiological.

You should have the following skills:

- Carrying out sanitary inspection of water supply sources.
- Defining sampling places and obtain water samples for analysis, to know how to fill in an accompanying form.
- Defininge the discharge (output) of water supply sources.

Situational task

There is a mine well in a courtyard of dwelling house in the village of Pavlovka of the Bogodukov District. The contour of the district has a natural bevel from the west to the east. There is an out-of-doors toilet at a distance of 30 meters from the well and higher on a surface relief. The dwelling house is placed at 25 meters to the north from the well. There is a fruit garden whose bed-rock is annually dressed with organic fertilizers at 35 meters from the well to the south. The walls of the well are new, wooden. There is a "clay lock" around the well. The well has a cover, but there is no canopy. The water from the well is taken with a bucket for common use. The depth of the well to the bottom is 15 meters. The depth to the surface of water is 10 meters.



1. Well; 2. Toilet;
3. Dwelling house; 4. Garden

1.Possible sources of water pollution in the well _____
_____
_____
_____

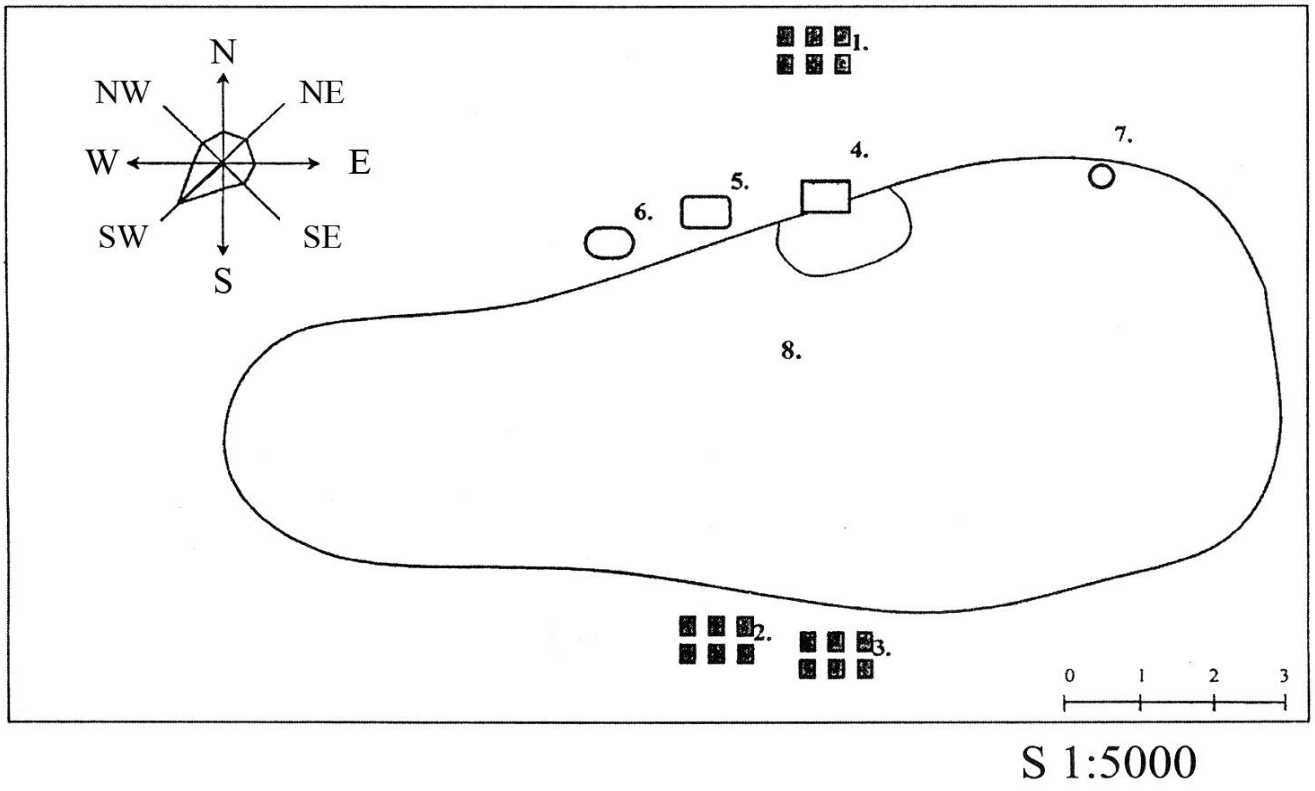
2. Possible paths of pollutants passing to the well: _____
_____
_____
_____
_____

3. Measures for improvement of the water source_____
_____
_____
_____
_____

Situational task

The village of Ivanovka of Donetsk Region is at the distance of 170 meters from the bank of the Olkovskiy reservoir. On the southern coast of the reservoir in the immediate proximity to it there are two populated areas. At 30 meters from the bank a collective poultry farm is placed, that uses part of the water surface for breeding ducks. At the distance of 50 meters to the west from the poultry farm there is the collective-farm's garage and at 100 meters to the west there is a depot of mineral fertilizers, part of which is stored in the open air.

In the given district the southwest wind prevails. The construction of a drinking water-pipe for the village of Ivanovka is planned. The water intake will be placed at the distance of 200 meters to the east of the poultry farm and of 3 meters from the bank.



1.Village Ivanovka. 2. Populated area. 3. Populated area. 4. Poultry farm. 5. Garage.
6. Depot of mineral fertilizers. 7. Place of the water intake. 8. The reservoir.

1. Possible pollutants of water in the reservoir: _____
_____
_____
_____
_____

2. Possible ways of pollution ingress to the reservoir _____
_____
_____
_____
_____

3. Correctness of the choice of place for the water intake:_____
_____
_____
_____
_____

4. Measures for improvement of water in the reservoir:_____
_____
_____
_____
_____
_____

Describe the procedure of water sampling for physico-chemical and bacteriological analysis:

1. From an open flowing water source (river):_____
_____
_____
_____
_____
_____

2. From an open source with stagnant water (lake, reservoir):_____
_____
_____
_____
_____
_____

3.From an artesian well:_____
_____
_____
_____
_____

4. From a mine well:_____
_____
_____
_____
_____
_____

5. From a water-tap:_____
_____
_____
_____
_____
_____
_____

Test questions

1. Classification of water sources in nature.
2. Hygienic performance of open (superficial) sources of water-supply.
3. Hygienic performance of underground sources of water-supply.
4. Basic hygienic requirements to good quality drinkable water.
5. The procedure of water sampling for bacteriological and sanitary-chemical analysis from an open pool.
6. The procedure of water sampling for analysis from underground sources.
7. The procedure of water sampling for analysis from mine and tubular wells.
8. The procedure of water sampling for analysis from a water-tap.
9. The hygienic value and procedure of sanitary-topographical inspection and description of sources of water-supply.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 10. THE METHODS OF DRINKING WATER QUALITY IMPROVEMENT. PURIFICATION.

Learning objective

- To learn the classification of conventional and special methods of water quality improvement, technology of their implementation on main facilities of water supply system.

Basics

You should know:
- The methods of drinking water quality improvement,
- The methods of drinking water purification.

You should have the following skills:
- Determining the doze of coagulant for purification of water,
- Estimating the results of purification.

1.Sampling of water for determination of the coagulant doze for its purification.
A sample of water (quantity is 1000 ml) was taken_____
(date)
by a laboratory assistant from the reservoir. It is situated _____
_____
The air temperature is _____, the atmospheric pressure is _____.
Precipitation is absent (or there is some precipitation) _____

2. The method of drinking water coagulation with the help of aluminium sulphate

2.1. The principle of the method _____

_____

_____

_____

_____

_____

2.2. Chemical reactions _____

_____

_____

_____

2.3. Chemical reagents and laboratory utensils _____

_____

_____

_____

_____

2.4. The course of the work:

2.4.1. Determination of carbonic water hardness _____

_____

_____

_____

_____

2.4.2 Calculation of quantity of 1% of aluminium sulphate in solution for the experiment

Experimental coagulation of water				
Number of the glass	Carbonic water hardness (degrees)	$Al_2(SO_4)_3$		
		mg/dm^3 of water	mg/200ml of water	ml /200 ml of water
	1°	40	8	0.8
1				
2				
3				

2.4.3. Experimental coagulation _____

_____

_____

2.5. Conclusion _____

_____

_____

_____

3. The method of coagulation with the help of iron sulfate

3.1. The principle of the method _____

_____

_____

_____

_____

_____

3.2. Chemical reactions _____
_____
_____
_____
3.3. Chemical reagents and laboratory utensils _____
_____
_____
_____
3.4. The course of the work:
3.4.1. Conditions of experimental coagulation with the help of iron sulfate

Number of the glass	$FeSO_4$			Active chlorine		Chloride of lime
	mg/L of water	mg / 200 ml of water	ml /200 ml of water	mg/L of water	mg / 200 ml of water	ml of 1% solution per 200 ml of water
1.	100	20	2	12.5		
2.	200	40	4	25.0		
3.	300	60	6	37.5		

3.4.2. Experimental coagulation_____
_____
_____
3.5. Conclusion _____
_____
_____
_____
_____
_____

Test questions

1. The methods of drinking water quality improvement and their hygienic characteristics.
2. The methods of drinking water purification and their hygienic characteristics.
3. The principle of coagulation of drinking water by aluminum sulfate.
4. The principle of coagulation of drinking water by iron sulfate.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 11. METHODS OF DRINKING WATER DISINFECTION

Learning objective

- To learn the methods of water disinfection, their classification, hygienic characteristic.

Basics

You should know:

- The notion and methods of drinking water disinfection.
- Water chlorination, methods of chlorination and reagents, which are used for this purpose, disadvantages of chlorination.
- Water disinfection by ozone treatment and treatment with ultraviolet rays, their hygienic characteristics.

You should have the following skills:

- Determining the doze of active chlorine and chloride of lime for disinfection of drinking water.

1. Essence of drinking water disinfection _____
_____

The methods of water disinfection:
physical: _____
_____

chemical:_____
_____
_____

the methods of water chlorination:
_____
_____
_____

Experimental work

Determining of chloride of lime doze for water disinfection

1. Sampling of water for experimental disinfection.

A sample of water (quantity is 6000 ml) was taken_____
(date)

by a laboratory assistant from a mine well. It is situated in _____
The air temperature is _____, the atmospheric pressure is _____.
Precipitation is absent (or there is some precipitation) _____

2. The method of disinfection of drinking water with normal doses of chlorine

2.1. The principle of the method _____
_____
_____

2.2. The chemical mechanism of disinfection_____
_____
_____

2.3. Chemical reagents and laboratory utensils_____
_____
_____
_____

2.4. The stages of the work.
2.4.1. Determining of active chlorine content in chloride of lime _____
2.4.2. Preparation of 1% of chloride of lime in solution for the experiment: _____
_____
_____
_____
2.4.3. Calculation of quantity of 1% chloride of lime in solution for the experiment
Bottle I – _____
Bottle II –_____
Bottle III –_____
2.4.4. Experimental chlorination of drinking water _____
_____
_____
2.4.5. Determination of residual chlorine in disinfected water _____
_____
_____
_____
_____
2.5. Calculation of chlorine dose for disinfection

№	Content of active chlorine		Amount of $Na_2S_2O_3$ (for titration)		Residual chlorine	Chlorine absorption	Dose of active chlorine	Dose of chlorine of lime
	mg/L	ml of 1% sol/L	ml/200	ml/L	mg/L	mg/L	mg/L	
1.	1							
2.	2							
3.	3							

3. Conclusion _____
_____
_____
_____
_____

Test questions

1. The notion and methods of disinfection of drinking water and their hygienic characteristics.
2. The notion of a “dose of active chlorine” for disinfection of drinking water, and “chlorine absorption”.
3. The principle of chlorination of water with usual dozes of active chlorine. The chemical reaction and reagents.
4. The water disinfection technique with usual dozes of active chlorine.
5. Residual chlorine in water, its hygienic significance and the method of determination.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 12. THE METHOD OF HYGIENIC ESTIMATION OF DRINKING WATER QUALITY BASED ON THE RESULTS OF LABORATORY ANALYSIS (centralized water supply)

Learning objective

- To master requirements to drinking water quality and hygienic importance of some of its indices.
- To acquire the method of the analysis reading and drinking water quality assessment for centralized water supply.

Basics

You should know:

- Hygienic indices and standards of drinking water quality (physical, organoleptic, chemical composition) and pollution indices (chemical, bacteriological – both direct and indirect), their scientific substantiation.
- Concept and characteristics of centralized (domestic and drinking water pipeline) water supply system.
- Set of measures during sanitary inspection of water pipeline main facilities exploitation (individual components of water pipeline and water supply network).

You should have the following skills:

- To state a hygienic value of drinking water quality according to the results of sanitary inspection of the water supply source and results of the laboratory analysis of water at centralized water supply system..
- To state a hygienic value of different methods of water quality improvement and exploitation efficiency of individual structures and facilities, used for this purpose.
- To develop a complex of measures to improve water quality and to prevent diseases caused by poor water quality.

Act
of the sanitary and hygienic estimation of drinking water quality
(the scheme of estimation)

1. The general conclusion about the quality of drinking water under study. Is the water drinkable or not?
2. Do all properties of this drinking water satisfy the Hygienic State Standard (or Hygienic Norms) or not?
3. Is there any pollution of the drinking water with organic substances?
4. Are there any organic substances of animal or plant origin?
5. When was the drinking water polluted?
6. What are the sources of pollution of the drinking water? Make up a general hygienic characteristics of the placement of the water supply source.
7. Are there any changes of mineral composition of the drinking water? Show the signs.
8. What hygienic and sanitary measures must be taken for improving quality of the drinking water, of the water-supply source and surrounding territory?

Situational task

Sanitary-topographical description of a water supply source: in the town of Kahovka a hospital for 300 beds will be built. There are 200 000 men in this town. The hospital will take the drinking water from a water-pipe. The water-pipe takes water from a borehole. The depth of the borehole is 30 m. For the current sanitary inspection, some water was taken for a sanitary test from the water pipe.

Analysis of the water

Organoleptic properties

Color is colourless
Taste is refreshing
Aftertaste is 2 points
Sediment is absent

Physical properties

Temperature is 7°C
Quantity of color is 20°
Transparency is 50 cm
Feculence is 0.5 NUF

Bacteriological indices

Total microbial number is 90
Coli-index is 0

Chemical composition

Permanganate oxidability is 5 mg/dm^3
Ammonia is 0.1 mg/ dm^3
Nitrites is 0.01 mg/dm^3
Nitrates is 35 mg/dm^3
Sulfates is 270 mg/dm^3
Chlorides is 300 mg/dm^3
Dry residue is 1100 mg/dm^3
General hardness is 8 mmol/dm^3
Iron is 0.3 mg/dm^3
Zinc is 1 mg/dm^3
Fluoride is 2 mg/dm^3
Manganese is 0,03 mg/ dm^3
Copper is 1 mg/dm^3
Arsenic is 0.0001 mg/ dm^3
Lead is 0.001 mg/dm^3

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes_____

Situational task

Sanitary-topographical description of water supply source: the settlement of the Kharkov Region takes running water from a borehole. The depth of the borehole is 170 m. The water runs into the tank tower before it gets a water-pipe. The tank tower is covered with rust. For the current sanitary inspection, a sanitary test of the drinking water from the water tap was made.

Analysis of the water

Organoleptic properties
Color is yellow brown
Aftertaste is 3 points
Smell is 2 points
Sediment is considerable

Physical properties
Temperature is 9°C
Quantity of color is 30°
Transparency is 20 cm
Feculence is 3.5 NUF

Bacteriological indices
Total microbial number is 120
Coli-index is 3

Chemical composition
Permanganate oxidability is 8 mg/dm^3
Ammonia is 1.3 mg/dm^3
Nitrites is 0.03 mg/dm^3
Nitrates is 31 mg/dm^3
Sulfates is 150 mg/dm^3
Chlorides is 230 mg/dm^3
Dry residue is 760 mg/dm^3
General hardness is 6,7 mmol/dm^3
Iron is 0.8 mg/dm^3
Zinc is 1,5 mg/dm^3
Fluoride is 1 mg/dm^3

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes_____
_____
_____
_____
_____
_____
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_____
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_____
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_____
_____
_____
_____
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_____
_____

Test questions

1. Sources of water in nature, their hygienic character.
2. Systems of water supply.
3. Hygienic requirements to drinking water quality for the centralized water supply.
4. Chemical indices of water pollution and their hygienic norms.
5. Indices of mineral composition of water and their hygienic standards.
6. Bacteriological indices of drinking water quality.
7. The methods of drinking water quality improvement.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 13. THE METHOD OF HYGIENIC ESTIMATION OF DRINKING WATER QUALITY BASED ON THE RESULTS OF LABORATORY ANALYSIS (decentralized water supply).

Learning objective

- To master knowledge about requirements to drinking water quality and hygienic importance of some of its indices.
- To master the method of the analysis reading and drinking water quality assessment for decentralized water supply system.

Basics

You should know:

- Hygienic indices and standards of drinking water quality (physical, organoleptic, chemical composition) and pollution indices (chemical, bacteriological – both direct and indirect), their scientific substantiation for decentralized (wells, groundwater intake structures, catchments) water supply.
- Concept and characteristics of decentralized water supply system.
- Set of measures during sanitary inspection of exploitation of main facilities of decentralized water supply system.

You should have the following skills:

- To state a hygienic value of drinking water quality according to the results of sanitary inspection of the source of water supply and the results of the laboratory analysis of water at decentralized water supply system.
- To state a hygienic value of different methods of water quality improvement and exploitation efficiency of individual structures and facilities, used for this purpose.
- To elaborate the complex of measures to improve water quality and to prevent diseases caused by poor water quality.

Act
of the sanitary and hygienic estimation of drinking water quality
(the scheme of estimation)

1. The general conclusion about the quality of the drinking water under study. Is the water drinkable or not?
2. Do all properties of this drinking water satisfy the Hygienic State Standard (or Hygienic Norms) or not?
3. Is there any pollution of the drinking water with organic substances?
4. Are there any organic substances of animal or plant origin?
5. When was the drinking water polluted?
6. What are the sources of pollution of the drinking water? Make up a general hygienic characteristic of the placement of the water supply source.
7. Are there any changes of mineral composition of the drinking water? Show the signs.
8. What hygienic and sanitary measures must be taken for improving the quality of the drinking water, of the water-supply source and surrounding territory?

Situational task

Sanitary-topographical description of a water supply source.

There is a well on the territory of the cottage in the suburb of Kharkov. The depth of the well is 6 m. Its framework is in good repair. There is a lid and a pail for common use. There is a "clay lock" around the well. There is a compost heap at 20 meters distance from the well and public convenience at 40 meters distance from the well.

Analysis of the water

Organoleptic properties

Color is yellow
Taste is 3 points
Smell is 3 points

Physical properties

Quantity of color is 30°
Feculence is 2.8 NUF
Sediment is plentiful

Bacteriological indices

Total microbial number is 430
Coli-index is 12

Chemical composition

Permanganate oxidability is 7.5 mg/dm^3
Ammonia is 3.0 mg/dm^3
Nitrites is 12 mg/dm^3
Nitrates is 60 mg/dm^3
Sulfates is 230 mg/dm^3
Chlorides is 250 mg/dm^3
Dry residue is 780 mg/dm^3
General hardness is 5.5 mmol/dm^3
Iron is 0.3 mg/dm^3
Fluorine is 0.9 mg/dm^3

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes_____

Situational task 2

Sanitary and topographical description of a water supply source.

There is a well at 50 m distance from the sea. The depth of the well is 10m. The framework of the well is wooden and in good repair. The framework of the well is 0.8 m height. The ground around the well is sand. There is a lid and a pail for common use. A holiday house takes this water for drinking and domestic purposes. For the current sanitary inspection, some drinking water was taken from it for analysis.

Analysis of the water

Organoleptic properties

Taste is salty
Aftertaste is 3 points
Smell is 3 points

Physical properties

Temperature is 12°C
Quantity of color is 25°
Feculence is 1.2 NUF

Bacteriological indices

Total microbial number is 200
E.coli and pathogenic bacteria are absent in 1 dm^3

Chemical composition

Oxidation is 6.5 mg/dm^3
Ammonia is 1.0 mg/dm^3
Nitrites is 0.01 mg/dm^3
Nitrates is 27 mg/dm^3
Sulfates is 650 mg/dm^3
Chlorides is 400 mg/dm^3
Dry residue is 1350 mg/dm^3
General hardness is 15 $mgequiv/dm^3$
Manganese is 0.8 mg/dm^3
Fluorine is 1.4 mg/dm^3

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes_____

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Test questions

1. Sources of water in nature.
2. Systems of water supply.
3. Hygienic requirements to drinking water quality for decentralized water supply.
4. Chemical indices of water pollution and their hygienic standards.
5. Bacteriological indices of drinking water.
6. The methods of drinking water quality improvement.
7.Hygienic requirement to the wells.

Signature of the Teacher_____ Signature of the Student _____

Subject 14. METHODS OF HYGIENIC ESTIMATION OF SOIL ACCORDING TO SANITARY EXAMINATION OF THE LAND PARCEL AND RESULTS OF LABORATORY ANALYSIS OF SAMPLES

Learning objective

- To understand hygienic, epidemic and endemic importance of soil.
- To master the methods of sanitary examination of the territory and soil sampling for laboratory analysis.
-To master the method of assessment of the soil pollution level and degree of its danger for people's health on the basis of the sanitary examination of the land parcel, and the results of soil samples' laboratory analysis.

Basics

You should know :

- Hygienic, epidemic and endemic importance of soil.
- Indices and the scale for assessment of sanitary condition of soil.
- Importance of soil as the medium for domestic and industrial waste treatment.

You should have the following skills:

- Carrying out the sanitary examination of the land parcel considering its function (territory of child institution, hospital, sewage treatment plant etc.).
- Determining sampling points and to take soil samples for sanitary-hygienic, bacteriological and helminthological analyses.
- Stating a hygienic value of the sanitary condition of the soil on the basis of sanitary examination of land parcel and results of laboratory analysis.

1. Sampling of soil for analysis.

The sample of soil was taken by laboratory assistant_____

When (date)

_____for analysis in quantity _____

where

2. The results of analysis

2.1. Determination of soil humidity by the formula

$$X = \frac{20 - y}{20} \cdot 100 =$$

where **x** is soil humidity in %

20 is the weight of soil before draying

y is the weight of soil after draying

2.2. Determination of soil porosity by the formula

$$P = \frac{(a + b - c) \cdot 100}{a} =$$

where **P i**s soil porosity in %

a is the value of soil for analysis in cm^3

b is the value of water in cm^3

c is the value of soil with water in cm^3

2.3. Determination of ammonia in the soil.

2.3.1 the method of determination_____

_____

2.3.4 chemical reagents and laboratory utensils_____

_____

_____

_____

2.3.5 the course of the work:

- preparation of colorimetric scale

Number of tube	Standard reagent NH_4C1	Distilled water	Segnetic salt	Nessler's reagent
1	1 ml			
2	2 ml			
3	3 ml			
4	4 ml			
5	5 ml			

- treatment of tested soil_____

_____

_____

_____

2.3.6 calculation of amount of ammonia in tested soil

$$X = \frac{a \cdot 100}{10} =$$

where : **x** is the amount of ammonia in tested soil,

a is the amount of ammonia in the tube, where the color is equal to the color of tested tube

10 is the weight of soil sample for analysis

Conclusion _____

_____

_____

_____

2.4. Situational task

In the outskirts of a settlement a land of 3 ha of the former cultivation area is assigned for construction of a new boarding school. During the sanitary examination of the land no sources of pollution were discovered. The relief has a slope in the southern direction. At the distance of 20 m from the northern border of the land an unequipped dump of domestic waste was found, which is at the distance of 100-130 m from the people houses. In the center of the land a soil sample of 40×20 m size was taken by "envelope" technique. 1 kg of soil was taken at each sampling point.

Laboratory analysis data:

Soil physical properties: physical sand (particles of the size bigger than 0.01 mm) – 85%, foreign impurities – up to 9%.

Sanitary-chemical criteria of epidemic safety: ammonia nitrogen – 45 mg/100 g, organic nitrogen – 0.6 mg/100 g, nitrites – 0.5 mg/100 g, nitrates – 3.3 mg/100 g, chlorides – 75 mg/100 g, Khlebnikoff's sanitary number – 0.78.

Sanitary-microbiological criteria of epidemic safety: microbial number – 5×10^5, coli-titer is 0.01, titer of anaerobes is 0.001, eggs of helminthes – 7 in 1 kg of soil, number of larvae and chrysalides of flies – 5 on 0.25 m^2.

Draw up a valid report about the sanitary condition of soil and make recommendations concerning the assignment of the land for school building

Solution of situational task

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Conclusion

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Test questions

1. Hygienic significance of soil.
2. Chemical composition of soil and its significance in spreading the endemic diseases.
3. Sampling of soil for analysis.
4. Mechanical composition of soil.
5. Physical properties of soil.
6. Methods of analysis of soil.
7. Sanitary-hygienic estimation of soil based on the laboratory analysis.

Signature of the Teacher_____ Signature of the Student _____

HYGIENE OF NUTRITION

Date_____

Subject 15. METHODS OF STUDY AND HYGIENIC ESTIMATION OF COLLECTIVE NUTRITION ADEQUACY

Learning objective

- To master the method of hygienic estimation of collective nutrition (by the data of weekly menu).

Basics

You should know:

- Types of nutrition, their hygienic character
- Physiological and hygienic requirements to rational nutrition
- Groups of population for nutritional norms
- Hygienic ground of rational nutrition
- Physiological and hygienic requirements and nutritional principles of compilation of daily and weekly menu

You should have the following skills:

- Estimating quantitative and qualitative adequacy of a nutrition
- Making the menu for a week
- Stating hygienic estimation of the menu using an algorithm
- Offering measures on hygienic correction of the menu

Situational task

Make up hygienic estimation of a menu per week for persons in recreation centre by this scheme (answer all questions)

The scheme of hygienic estimation of a menu

1.Variety of food-stuffs per week and per day.
2.Ratio of the liquid (first) and concentrated (second) courses during a day.
3.Some meals contain dishes, cooked from identical or the same products.
4.Presence of dishes stimulating appetite at each meal.
5.Alternation of cereals and vegetable garnishes for meals during each day and week.
6. Day by day alternation of the first spicy and neutral courses.
7. Variety of dessert courses for meals.
8. Keeping rules of limited repetition of identical courses within one week.
9. Distribution of courses for meals every day.
10.Conclusion

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Menu for week

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast	Mashed potatoes with a cutlet Bread and butter Cheese Tea	Mushroom soup Milk Bread and butter Cheese	Regular coffee Curds with sour cream	Curds with sour cream Cheese Pancakes Tea Bread	Mashed potatoes Borsch with meat Tea Bread	Macaroni with meat Juice Stewed apple Bread	Boiled eggs Cucumber salad Mashed potatoes Milk Bread
Dinner	Borsch with meat Stewed cabbage Milk Bread	Fish soup Stew with mashed potatoes Apple juice Bread	Stewed meat with vegetables Baked apples Bread	Fish soup Fried fish with mashed potatoes	Borsch with meat Stew Black coffee	Macaroni with meat Juice Bread	Borsch with meat Mashed potatoes with meat Coffee
Supper	Rice cereal with milk Omelette Black coffee Bread	Mashed potatoes with a cutlet Rice gruel Bread	Porridge with milk Bread and butter Cheese Sour milk	Porridge with milk and fruit Tea Bread	Crab salad Semolina with milk Bread	Potato soup Mashed potatoes with meat Sour milk	Macaroni with a cutlet Black coffee Bread and butter

Test questions

1.Biological essence of nutrition.
2.Classification of food nutrients and food products.
3.Types of nutrition.
4.Hygienic requirements to rational nutrition.
5.Hygienic requirements to a menu for a week.
6.The main criteria of qualitative variety of nutrition in a menu for a week.
7.Distribution of first, second and third courses in a menu for a week.
8.Principle of variety of food - stuffs during a week.
9.Right alternation of cereals and vegetable garnishes, spicy and neutral courses and dessert courses in a menu.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject 16. THE CALCULATION METHOD OF INDIVIDUAL NUTRITION ADEQUACY ESTIMATION

Learning objective

- To master the methods of medical control of the energy expenditure and nutrition in different social and professional, sex and age population groups.
- To master methods of determination of individual or organized collective actual nutrition and its adequacy to the energy expenditure and nutrient needs.

Basics

You should know:

- Physiological basics of metabolism in the human organism.
- Energy metabolism and its regulations. Constituents of the daily energy expenditure.
- Physiological and hygienic characteristic of the basal metabolism and specific-dynamic effect of food.
- Dependence of the human energy metabolism on climate and weather conditions, microclimate, emotional stress and physical load.
- Rational nutrition as the basis of the sufficient energy supply for the human organism.
- Hygienic requirements to chemical composition and caloric content of the ration for different professional groups

You should have the following skills:

- Monitoring the daily activity of an individual or a group with similar daily routine and nutrition.
- Using directive, reference materials, formulas, tables, perform the necessary calculations (analyses).
- Calculating chemical composition and caloric content of the ration, to estimate the results

Situational task

Give hygienic estimation of daily ration of a 30-year-old nurse, her weight is 65kg.

Chemical composition and caloric content of the daily ration:

Animal proteins = 30,4 g	Phosphorus = 800 mg	Vitamin B_6 = 1.5 mg
Vegetable proteins = 20 g	Magnesium = 300 mg	Niacinum =10 mg
Animal fats = 80 g	Iron= 12 mg	Caloricity of breakfast = 504kcal
Vegetable fats = 15 g	Vitamin C = 40 mg	Caloricity of dinner = 670kcal
Simple saccharum = 125 g	Vitamin A = 0.5 mg	Caloricity of supper = 1032 kcal
Starch = 152 g	Vitamin B_1 =0.7 mg	Caloricity of animal origin = 913.7 kcal
Calcium = 500 mg	Vitamin B_2 = 1.1 mg	

Determine the professional group of the nurse and hygienic norms of caloric value, proteins, fats and others by the tables

	Estimated index	The actual content in the ration	Physiological standard	Discrepancy
1.	Total caloric value (kcal)			
2.	Calories of an animal origin a) Kcals b) % to total caloric value			
3.	Proteins (gram)			
4.	Animal proteins a) grams b) % to total quantity of proteins			
5.	Caloric value at the expense of proteins a) Kcals b) % to total caloric value			
6.	Fats (gram)			
7.	Vegetable fats a) grams b) % to total quantity of fats			
8.	Caloric value at the expense of fats a) Kcals b) % to total caloric value			
9.	Carbohydrates (gram)			
10.	Simple saccharum a) grams- b) % to total quantity of carbohydrates			
11.	Caloric value at the expense of carbohydrates a) Kcals b) % to total caloric value			
12.	Ratio between proteins, fats and carbohydrates (gram)			
13.	Vitamins (mg) a) A b) B_1 c) B_2 d) B_6 e) PP f) C			

14.	Mineral substances (mg) a) Calcium b) Phosphorus c) Magnesium d) Iron			
15.	Caloricity of breakfast a) Kcals b) % to total caloric value of ration			
16.	Caloricity of dinner a) Kcals b) % to total caloric value of ration			
17.	Caloricity of supper a) Kcals b) % to total caloric value of ration			

Conclusion_____

Recommendations _____

_____

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Test questions

1. The essence of the quantitative adequacy law.
2. The main components of human power inputs.
3. The essence of the qualitative adequacy law.
4. Coefficient of physical activity of different professional groups and its significance.
5. Proteins in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in proteins.
6. Fats in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in fats.
7. Carbohydrates in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in carbohydrates.
8. Physiological functions and hygienic standard of vitamins.
9. Mineral substances and their physiological need.
10. Rational correction of proteins, fats and carbohydrates in daily ration.
11. Rational correction of proteins and fats of animal and vegetable origin and simple saccharums and starch in the ration.
12. Rational distribution of daily calories of the ration according to the daily meals.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 17. METHOD OF DETERMINATION AND HYGIENIC ESTIMATION OF NUTRITIOUS STATUS BY THE INDEX OF VITAMIN PROVISION OF THE ORGANISM

Learning objective

- To master the methods of detection and assessment of the vitamin sufficiency in the organism and the methods and measures of hypo- and avitaminosis prevention.

Basics

You should know:

- Classification and physiological significance of vitamins in the organism.
- The most frequently occuring hypovitaminosis states in cases of both individual and collective nutrition. Their causes.
- Avitaminosis and their clinical characteristics.
- Hygienic principles of prophylaxis of hypovitaminosis and avitaminosis.

You should have the following skills:

- Detecting the hypo- and avitaminosis in cases of both individual and collective nutrition.
- Organizing the hypovitaminosis prevention measures and assess their effectiveness.
- Revealing the deficit of vitamins in the human organism by determining of the quantity of vitamin C in urine and to estimate the results.

1. Urine sampling for analysis.

The second sample of urine was taken by laboratory assistant_____

from _____ children in a boarding-school _____

2. Determination of vitamin C in urine

2.1 .The method of determination_____

2.2.The principle of the method_____

_____

_____

_____

_____

_____

_____

2.3.Chemical reaction of determination_____

_____

_____

2.4.Chemical reagents for determination of vitamin C and laboratory utensils

_____

_____

_____

_____

_____

2.5.The course of the work.

2.5.1. the "direct" experiment _____

_____

_____

_____

Result of the "direct" experiment X_d _____

2.5.2 the "blind" experiment_____

_____

_____

Result of the "blind" experiment X_b _____

2.5.3. correction factor for Thilman's reagent titer K _____

2.6. Calculation of daily excretion of vitamin C in urine by the formula

$$DE = \frac{(X_d - X_b) \cdot K \cdot 0.088 \cdot 1150}{5} = -\frac{\quad}{\quad} = \quad \text{(mg/day)}$$

where

0.088 – equivalent of Thilman's reagent (1 ml of 0.001N solution) by ascorbic acid;

1150 – average daily diuresis (ml)

5 – volume of urine under study (ml)

3.Conclusion_____

_____

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Test questions

1. The physiological role of vitamins and hygienic norms in daily ration.
2. Main food sources of vitamin C in nutrition.
3. Etiology, pathogenesis, clinical picture of avitaminosis and hypovitaminosis C.
4. The methods of vitamin C sufficiency control in the human organism.
5. The method of vitamin C determination in urine (by Thilman's reagent).
6. The methods of prophylaxis of avitaminosis and hypovitaminosis C.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 18. METHODS OF EXPERT ASSESSMENT OF FOOD PRODUCTS ACCORDING TO THEIR LABORATORY ANALYSES

Learning objective

- To master the methods of food products quality and freshness assessment according to their organoleptic criteria and laboratory analyses results.

Basics

You should know:

- Organoleptic criteria of food products quality and freshness.
- Principles of hygienic regulation of the food products quality and freshness.
- Full-value indices and deterioration indices of main food products.

You should have the following skills:

- Sampling the products and ready meals, to send them to a laboratory for analysis, fill in the accompanying form.
- Assessing the organoleptic quality and deterioration indices of food products.
- Using the State Standards and other normative documents during the assessment of the results of food products and ready meals laboratory analysis. Making the expert conclusion according to these results.

Determination of main properties of milk quality

1. Sampling of milk for analysis.

The sample of milk was taken by the _____
(who)

from _____
(where, when)

for analysis in quantity _____

Producer _____

Shelf life _____

2. The results of the analysis:

2.1. Organoleptical properties:

2.1.1 color _____

2.1.2. smell _____

2.1.3. taste _____

2.1.4. aftertaste _____

2.1.5. consistence _____

2.1.6. mechanical admixture _____

2.2. Physical properties:

2.2.1. temperature _____

2.2.2. Density (by reading of lactodensimeter) q _____

Density (with correction for temperature) q_t _____

2.3. Chemical composition:

2.3.1 acidity

_____

_____

_____

_____

_____

quantity of fats F

_____

_____

_____

_____

_____

_____

_____

2.3.3 dry residue by Farrington's formula

$X = \frac{4.8F + A}{4} + 0.5 =$ _____ + 0.5 = = (%)

where A – specific gravity of the milk (only two last figures)

F – quantity of fats (%)

2.4. Falsification of milk:

2.4.1 Determination of soda _____

_____

_____

2.4.2 Determination of starch _____

_____

_____

2.5. Bacteriological indices:

2.5.1 microbial number _____

2.5.2. coli-titer _____

2.5.3. titer of pathogenic microbes _____

3.Conclusion:

_____

_____

_____

_____

_____

Hygienic estimation of bread quality

1. Sampling of bread for analysis

The sample of bread _____ was taken by the _____

(sort of bread) (who)

from _____

(where, when)

for analysis in quantity _____

Producer _____

2. The results of the analysis:

2.1 outward appearance:

2.1.1 surface _____

2.1.2 color _____

2.1.3. crust _____

2.1.4. shape _____

2.2.State of the crumb:
2.2.1 quality of baked through _____
2.2.2 elasticity _____
2.2.3 freshness _____
2.3. Determination of organoleptic properties:
2.3.1. taste _____
2.3.2 aftertaste _____
2.3.3 smell _____

2.4. Determination of physical properties:
2.4.1 porosity _____
_____
_____
_____
_____
2.4.2 humidity _____
_____
_____
_____
_____
2.5. Determination of chemical properties:
2.5.1 acidity _____
_____
_____
_____
_____
_____

3.Conclusion:
_____
_____
_____
_____

Hygienic estimation of meat quality

1. Sampling of meat for analysis
The sample of meat _____ was taken by the _____
(pork, beef or other) (who)
from _____
(where, when)
for analysis in quantity _____
2. The results of the analysis:
2.1 outward appearance and color of surface _____
_____
2.2 consistence _____
_____

2.3. smell _____
_____
2.4. state of muscles_____
_____
2.5 state of fat _____
_____
2.6 state of tendons _____
_____
2.7 transparency and smell of broth _____
_____
2.8 The chemical analysis for freshness of meat
2.8.1 determination of ammonia _____
_____
_____
2.8.2 determination of hydrogen sulfide _____
_____
_____
2.9 Helminthological analysis
2.9.1 analysis for measles (pork measles) _____
2.9.2 analysis for trichinella (porkworm) _____

3.Conclusion:
_____
_____
_____
_____
_____

Test questions

1. Nutritious value of milk.
2. The main hygienic requirements to the milk quality.
3. The methods of determination of organoleptic indices of milk quality.
4. The methods of determination of physical and chemical indices of milk quality.
5. The methods of determination of bacteriological indices of milk quality.
6. The methods of determination of the falsification of milk (by soda and starch).
7. Nutritious value of bread.
8. Hygienic standards of bread quality.
9. The methods of determination of organoleptic properties of bread.
10. The methods of determination of physical properties of bread.
11. The methods of determination of chemical properties of bread.
12. Nutritious value and classification of meat.
13. Hygienic demands to meat quality.
14. The method of determination of organoleptic properties of meat.
15. The chemical analysis for freshness of meat.
16. The methods of bacteriological and helminthological inspection of meat.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 19. THE INVESTIGATION METHOD OF FOOD POISONINGS OF MICROBIAL ETIOLOGY

Learning objective

- To master the knowledge on food poisonings, their etiology, clinic, methods of investigation, general and specific prophylaxis.

Basics

You should know:

- Definition of "food poisonings" and their classification.
- The food poisoning etiology, pathogenesis, clinic and prevention.
- Sanitary-hygienic characteristic of food poisonings of microbial etiology and their prophylaxis

You should have the following skills:

- Determining the type of food poisoning and its cause, to provide the medical help in its cases.
- Organizing, investigation and determination the cause (food product or meal) of food poisoning of microbial nature.
- Organizing preventive measures for the elimination of the food poisoning causes and food poisoning prevention.
- Performing the act of food poisoning investigation (food product or dish)

Situational task 1

The students living in the neighboring rooms of a hostel became sick. During the investigation it was established, that the disease began on 12.09.20__ after a "beer" party where one of the students brought a dried fish bought in the spontaneous market near the underground. Except for the fish, the young men ate chips and crackers, got in at kiosk. Out of 6 participants, 2 persons were sick. At night, 5 hours after the fish had been eaten, all of them had nausea, headache, stomach ache, dryness in the mouth, and one of the students had numerous vomiting. Next day sharp deterioration of sight, hallucination, infringement of swallowing were noted. One of the students had full speech disturbance (aphonia). The body temperature was normal. At 12 o'clock in the afternoon both victims in a grave condition were hospitalized.

The act
of the food poisoning investigation

1. The date (year, month, date) of a food poisoning _____
2. The number of sick people _____
3. Contingent of sick people _____
4. Their address _____
5. Main clinical symptoms of the disease_____

_____

_____

6. Duration of the disease, its seriousness_____

_____

7. The number of hospitalized persons _____
8. The number of persons who have sick-leave certificates _____

9. Detailed information about sick people food intake during the last two days _____

_____

_____

_____

_____

10. How many hours passed between the last meal and the first symptoms of the disease?

_____

11. Possible reasons of the disease: what are the most probable products that could cause this disease? _____

_____

_____

12. The supposed nature (origin) of disease (microbial or non-microbial) _____

_____

13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) _____

_____

_____

_____

14. What food and products must be withdrawn from use and sent for laboratory analysis?

_____

_____

_____

15. What discharges from the patients should be investigated? _____

_____

_____

16. After determining the reasons of the disease its liquidation measures should be outlined _____

_____

_____

_____

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results

_____

_____

_____

_____

Situational task 2

The disease began on 17.11.20__ after celebrating a birthday in a student's group for which the cream cake, some chocolates and oranges were bought at a confectionery shop. In 2 hours out of 10 persons, who participated in the tea-drinking, 6 felt sudden deterioration of health, fever, nausea, a sharp pain in the upper part of the stomach. With 2 girls unrestrained vomiting and diarrhea were marked. One of them was has been delivered to hospital in a condition of a collapse by the ambulance. With the others the condition started to improve and in 6-8 hours the symptoms of the disease were over.

The act
of the food poisoning investigation

1. The date (year, month, date) of a food poisoning _____
2. The number of sick people _____
3. Contingent of sick people _____
4. Their address _____
5. Main clinical symptoms of the disease_____

_____

_____

6. Duration of the disease, its seriousness_____

_____

7. The number of hospitalized persons _____
8. The number of persons who have sick-leave certificates _____
9. Detailed information about sick people food intake during the last two days _____

_____

_____

_____

_____

10. How many hours passed between the last meal and the first symptoms of the disease?

_____

11. Possible reasons of the disease: what are the most probable products that could cause this disease? _____

_____

_____

12. The supposed nature (origin) of disease (microbial or non-microbial) _____

_____

13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) _____

_____

_____

_____

14. What food and products must be withdrawn from use and sent for laboratory analysis?

_____

_____

_____

15. What discharges from the patients should be investigated? _____

_____

_____

16. After determining the reasons of the disease its liquidation measures should be outlined _____

_____

_____

_____

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results

_____

_____

_____

_____

Test questions

1. The notion of food poisonings and their classification.
2. The main features of food poisoning.
3. The causes of food toxic infections.
4. The sanitary and epidemiological character of toxicoinfections and their prophylaxis.
5. The sanitary and epidemiological character of food toxicoinfections caused by spore-producing microorganisms and their prophylaxis.
6. The sanitary and epidemiological character of staphylococcus toxicosis and its prophylaxis.
7. The sanitary and epidemiological character of botulism and its prophylaxis.
8. Mycotoxicosis, their classification and prophylaxis

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 20. THE INVESTIGATION METHOD OF FOOD POISONINGS OF NON-MICROBIAL ETIOLOGY

Learning objective

- To master the knowledge on food poisonings, their etiology, clinic, methods of investigation, general and specific prophylaxis.

Basics

You should know:

- The classification of food poisonings of non-microbial etiology .
- Sanitary-hygienic characteristic of food poisonings of non-microbial etiology and their prophylaxis

You should have the following skills:

- Determining the type of food poisoning and its cause, provide the medical help in such cases.
- Organizing, investigating and determining the cause (food product or meal) of food poisoning of non-microbial nature.
- Organizing preventive measures for the elimination of the food poisoning causes and food poisoning prevention.
- Performing the act of food poisoning investigation (food product or dish)

Situational task 1

In a family, of 4 persons, consisting of the parents and two children (2 and 6 years of age), in October, 10th, 20__, the husband, the wife and the senior child became simultaneously sick. The disease began 10 hours after the dinner where menu consisted of the vegetable soup, home made pickled mushrooms, beefsteak with rice, cherry juice and bread. The younger child ate only a vegetable soup, mashed potatoes and juice. He sickness was manifested in the sharp form. Symptoms of the disease: numerous vomiting, pains in epigastric area, frequent liquid stool of mucinous-watery character, unrestrained thirst. Body temperature of the adults - mild pyrexia, of the child - 37,7^{o}C.

All the patients were hospitalized to the regional hospital on11.10.20__. The condition of the sick adults was serious, the child's - the heaviest. By the evening of October, 12th the child developed spasmes and he died from sharp cardiovascular insufficiency. The condition of the adults at the moment of research remains serious, non-stable. Intensive therapy is conducted.

The act
of the food poisoning investigation

1. The date (year, month, date) of a food poisoning _____
2. The number of sick people _____
3. Contingent of sick people _____
4. Their address _____
5. Main clinical symptoms of the disease_____

_____

_____

6. Duration of the disease, its seriousness_____

_____

7. The number of hospitalized persons _____
8. The number of persons who have sick-leave certificates _____
9. Detailed information about sick people food intake during the last two days _____
_____
_____
_____
_____
10. How many hours passed between the last meal and the first symptoms of the disease?
_____
11. Possible reasons of the disease: what are the most probable products that could cause this disease? _____
_____
_____
12. The supposed nature (origin) of disease (microbial or non-microbial) _____
_____
13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) _____
_____
_____
_____
14. What food and products must be withdrawn from use and sent for laboratory analysis?
_____
_____
_____
15. What discharges from the patients should be investigated? _____
_____
_____
16. After determining the reasons of the disease its liquidation measures should be outlined _____
_____
_____
_____
17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results
_____
_____
_____
_____

Situational task 2

In the family of three people, consisting of a husband, a wife (37 and 35 years of age correspondingly) and an 11-year-old child, on December 9th, 20__ the wife and the child became sick. The onset of the disease in the child was 30 minutes after supper. Menu consisted of fried fish (tuna) with mashed potatoes, cabbage salad, bread, tea and a cream cakes. The symptoms of the disease: reddening of the face with sensation of heat, a headache, nausea, a stomach ache, diarrhea, tachycardia (110 ictus/min), nettle-rash on the body. The wife developed similar, but less expressed symptoms an hour after supper. The father who only drank tea with the cake at supper, didn't have any symptoms. The ambulance surgeon established after the examination the child's and her mother's arterial pressure was low (80/50 and 85/55 mm Hg accordingly) and for specification of the preliminary diagnosis proposed hospitalization which the patients refused. The doctor performed gastric lavage in the victims and prescribed the reception of the activated coal. Besides, injections of a Dimedrol (for the mother) and Tavegyl (for the daughter), were made. The condition of patients started to improve and by the morning of December, 10th the most part of symptoms of disease disappeared.

The act
of the food poisoning investigation

1. The date (year, month, date) of a food poisoning _____
2. The number of sick people _____
3. Contingent of sick people _____
4. Their address _____
5. Main clinical symptoms of the disease_____

_____

_____

6. Duration of the disease, its seriousness_____

_____

7. The number of hospitalized persons _____
8. The number of persons who have sick-leave certificates _____
9. Detailed information about sick people food intake during the last two days _____

_____

_____

_____

10. How many hours passed between the last meal and the first symptoms of the disease?

_____

11. Possible reasons of the disease: what are the most probable products that could cause this disease? _____

_____

_____

12. The supposed nature (origin) of disease (microbial or non-microbial) _____

13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) _____

_____

_____

_____

14. What food and products must be withdrawn from use and sent for laboratory analysis?

_____

_____

_____

15. What discharges from the patients should be investigated? _____

_____

_____

16. After determining the reasons of the disease its liquidation measures should be outlined _____

_____

_____

_____

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results

_____

_____

_____

_____

Test questions

1. The classification of food poisonings of non-microbial nature.
2. The poisonings by poisonous plants and animal tissues.
3. The poisonings by the products of the plants and animal tissues which are poisoned in certain conditions.
4. The poisonings with chemical substances.
5. The poisonings of non-identified origin.
6. The measurements for prophylaxis of food poisonings of non-microbial nature.

Signature of the Teacher_____ Signature of the Student _____

HYGIENE OF LABOUR

Date _____

Subject 21. METHODS OF INVESTIGATION AND HYGIENIC ESTIMATION OF DUSTINESS AND CHEMICAL POLLUTION OF AIR IN THE WORK AREA

Learning objective

- To master the knowledge of air pollution sources of industrial premises (dust and harmful chemical substances)
- To master the basic methods of sampling the work area air for the sanitary-chemical analysis
- To master the main methods of sanitary and chemical analysis of the air samples.
- To master the techniques of the qualitative and quantitative analysis of dust content of air and a technique of definition of carbon monoxide and sulphureous gas concentration in the air of industrial premises

Basics

You should know:

- chemical composition of air
- hygienic and pathogenic significance of separative pollutants of air in working zone.
- hygienic character of dust, its sources and classifications, influence of dust on the human body,
- methods and devices for determination of dust,
- sources of carbon monoxide and sulfurous gas,
- measures of dust control.
- Fundamentals of Ukrainian legislation in the field of protection of air in working zone.

You should have the following skills:

- Calculating the amount of dust in air
- Determining carbon monoxide and sulfurous gas in air
- Estimating the results of analysis.
- Substantiating and carrying out sanitary and hygienic measures regarding safe working conditions.

Determination and hygienic estimation of dustiness in air

Situational task 1

A sample of dust was taken by the method of sedimentation on the porcelain cup of area 20 cm^2 placed on the roof of a house, which is located on the lee from cement works.
Date of experiment
Weight of covering glass before dust sampling is 155 mg.
Weight of covering glass after dust sampling is 158 mg.
Duration of experiment is 24 hours.

1.1. Devices for determination _____

2.1. The principle of determination_____

_____

_____

_____

1.3.Date of the determination _____

1.4. Area of the covering glass_____

1.5.Weight of the covering glass before sampling of dust_____

1.6.Weight of the covering glass after sampling of dust_____

1.7.Calculate quantity of dust settled from the atmospheric air:

1.7.1. in g / m^2 •24 hours

1.7.2. in t / km^2 •1 year

Conclusion _____
_____
_____
_____

Situational task 2

A sample of dust was taken by the method of aspiration on AFA filter in the industrial area of the city. The air was aspirated through the filter with velocity of 10 L/m. The time of the exposition was 30 min. The weight of AFA filter before the dust sampling was 67 mg. The weight of AFA filter after the dust sampling was 67.5 mg. Temperature of the air at the moment of dust sampling was 27 °C, the atmospheric pressure was 751 mm Hg.

2.1.Devices for determination_____
_____
_____

2.2.Place of the experiment_____

2.3.Results of determination:

2.3.1 weight of the filter AFA before dust sampling P_1_____

2.3.2 weight of the filter AFA after dust sampling P_2_____

2.3.3 velocity of the air movement with help of device_____

2.3.4 time of the exposition_____

2.3.5 volume of tested air_____

2.3.6 air temperature at the moment of determination_____

2.3.7 atmospheric pressure at the moment of determination_____

2.3.8 reduction of the volume of the tested air to normal condition by the formula

$$V_{760}^{0} = \frac{V^{t}}{(1+\alpha t)} \cdot \frac{B}{760} = \text{\_\_\_\_\_} =$$

2.3.9. Calculation of dust concentration in air in mg/m^3

$$X = \frac{(P_1 - P_2) \cdot 1000}{V^{o}_{760}} = \text{\_\_\_\_\_} =$$

3.Conclusion_____
_____
_____

Situational task 3

There are the following dust particles on the filter AFA:
Dust particles of size to 2 μ= 30.
Dust particles of size from 2 to 4 μ = 35.
Dust particles of size from 4 to 6 μ = 40.
Dust particles of size from 6 to 10 μ = 25.
Dust particles of size from 10 μ and more in 10.

Calculate the dust formula and give the conclusion about the degree of dust dispersion.

Dust formula

Size of dust particles	to2 μ	from 2 to 4 μ	from 4 to 6 |μ	from 6 to 10 μ	more than 10 μ
Quantity of dust particles (in absolute figures)					
in%					

Conclusion _____
_____
_____
_____

3**. Hygienic characteristics of main industrial air pollutants**.

3.1. Carbon monoxide

3.1.1. The sources of carbon monoxide in the industrial air _____
_____
_____
_____

3.1.2. Influence of carbon monoxide on the human organism _____
_____
_____
_____

3.2. Sulfurous gas

3.2.1. The sources of sulfurous gas in the industrial air _____
_____
_____
_____

3.2.2. Influence of sulfurous gas on the human organism _____
_____
_____
_____

Practical work

Determination of the carbon monoxide

3.1. Devices for determination_____

3.2. The method of determination_____
_____
_____
_____

3.3. The principle of the method_____
_____
_____
_____
_____
3.4. The course of the work
3.4.1. preparation of indicator tubes for analysis_____
_____
_____
3.4.2. aspiration of tested air through the indicator tubes
_____
_____
_____
_____
_____
3.4.3. visual colorimetry_____
_____
_____
_____
_____

3.5 Calculation

$$C = \frac{\alpha \cdot 1000}{n} =$$

where
C is quantity of carbon monoxide in air,
n is number of aspirations,
1000 is recalculation in 1 m^3
a is amount CO on the indicator tube.

3.6.Conclusion_____
_____
_____
_____
_____

Test questions

1**.** Hygienic significance of chemical composition of air.
2. Carbon monoxide as an air pollutant, the sources of carbon monoxide in the air, its toxic effect and allowed concentration.
3. Express-method of estimation of carbon monoxide with the help of "CO–apparatus".
4. Sulfurous gas as an air pollutant, the sources of sulfurous gas in the air, its toxic effect and allowed concentration.
5. Prophylaxis of unfavorable influence of carbon monoxide and sulfurous gas on the organism.

Signature of the Teacher_____ Signature of the Student _____

Date_____

Subject 22. METHODS OF HYGIENIC ESTIMATION OF PHYSICAL AND CHEMICAL FACTORS OF INDUSTRIAL CONDITIONS

Learning objective

- To learn about general hazards caused by industrial environment and occupational injuries and diseases as their consequences.
- To learn about methods and techniques for determination of the most common types of occupational hazards and their impact on employees' organism and health; about legislative, administrative, technical measures for health protection and prevention of occupational diseases.

Basics

You should know:
- Fundamentals of Ukrainian legislation in the field of hygiene and labour protection.
- Classification and characteristics of occupational hazards.
- Physiologic, biochemical and pathophysiological signs and characteristics of organism's response to occupational hazards.
- Method of investigation and measures of prophylaxis of occupational diseases and occupational poisonings

You should have the following skills:
- Determining basic agents of industrial environment and work process that may have negative impact on the employees, revealing and assessing the signs of such impact on organism.
- Substantiating and carrying out sanitary and hygienic measures regarding safe working conditions.
- Performing the act of investigation with a conclusion and recommendations for prophylaxis of occupational diseases and poisonings.

Situational task

The results of complex investigation of working conditions at the metallurgical factory
2010 June, 25.

1. Determining of industrial microclimate.
1.1 The air temperature is 30°C
1.2 Readings of wet thermometer of psychrometer is 14 °C
1.3 Readings of catathermometer:
1.3.1. Factor of catathermometer (F) = 600
1.3.2. The time of spirit dropping from + 38°C till 35°C (T) = 2 min 17 sec.
1.3.3. Atmospheric pressure (B) = 763 mm Hg
2. Measuring the noise
The level of noise = 85 dBA
3. Determination of dust quantity in air:
Weight of filter before analysis (P_1) = 130 mg
Weight of filter after analysis (P_2) = 130.7 mg
The time of exposition (a) = 25 min
Velocity of aspiration (b) = 5 1 per min
4. Determination of chemical composition of air:
4.1 Concentration of carbon monoxide = 30 mg/m^3
4.2 Concentration of sulphureous gas = 7.5 mg/m^3

It’s necessary to determine parameters of industrial conditions at the workplace and to make up hygienic estimation of them.

Solution of the task

1. Determination of relative humidity of air by the table in % _____
2. Determination of velocity of air movement by the formula:

$H = \frac{F}{T} =$

$Q = Q_1 - Q_2 =$

$V = \left(\frac{\frac{H}{Q} - 0{,}20}{0{,}40} \right)^2 =$

Where
H is cooling ability of air.
F is factor of catathermometer.
T is the time of spirit dropping from + 38°C till + 35°C
Q_1- average temperature of catathermometer
Q_2 - air temperature at the working place

3. Determination of dust in the air

3.1 Calculate of volume of tested air

_____

_____

3.2 Reduce the tested volume of air to normal conditions by the table and formula

$V_{760}^{0} = \frac{V^t}{(1+\alpha t)} \cdot \frac{B}{760} =$ _____ =

3.3 Calculate dust quantity in the air

$K = \frac{(P_2 - P_1) \cdot 1000}{V_{760}^{0}} =$ _____ =

4. Compare of the results of determination and calculation of physical and chemical parameters of industrial conditions with hygienic standards and make up the conclusion

4.1 What are the unfavorable factors of industrial conditions?

_____

_____

_____

_____

_____

_____

_____

4.2 What occupational diseases may occur in these conditions?

_____
_____
_____
_____
_____
_____
_____
_____
_____

4.3 Measures for prophylaxis of occupational diseases

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Test questions

1. Classification of unfavorable industrial factors of physical origin
2. Industrial noise and its classification.
3. Noise disease, its pathogenesis, clinical symptoms and prophylaxis.
4. Industrial vibration, its classification.
5. Vibration disease, its pathogenesis, clinical symptoms and prophylaxis.
6. Industrial microclimate and its classification.
7. Diseases, connected with unfavorable microclimate and their prophylaxis.
8. Industrial dust and its classification. Sources of dust at the industrial enterprises.
9. Dust pathology and its prophylaxis.

Signature of the Teacher_____ Signature of the Student _____

Date ____

Subject 23. SANITARY INVESTIGATION OF AN OCCUPATIONAL POISONING

Learning objective

- To acquire knowledge about the effect of occupational hazards on workers' health as well as regulations and procedure of investigation concerning occupational diseases and poisonings, proper paperwork.
- To substantiate and take the indispensable therapeutic and prophylactic measures.

Basics

You should know:

- Fundamentals of toxicology of chemical compounds – routes of penetration into organism, their transformation, mechanism of action, excretion.

- Methods and techniques of intoxication prophylaxis, basic criteria of hygienic standardization of chemical compounds in the working zone air, in the other environments.

You should have the following skills:

- Recognizing and investigateing cases of poisonings and diseases having chemical character, using appropriate normative and directive documentation.
- Recommending and taking prophylactic measures regarding occupational diseases and poisonings, assessing their effectiveness.
- Drawing up the documents concerning investigation of the cases of occupational poisonings and diseases properly.

Situational problem

Four workers of a machine-building shop of an engineering plant referred to the plant polyclinic one hour before the end of their work shift complaining of heaviness in the head, headache in the regions of the temples and forehead, tinnitus, a sense of weakness, rapid pulse, nausea.

Before seeking medical advice, two workers vomited.

On examination, a factory's sectorial doctor objectively revealed that the mucosa and skin integuments of the sick workers were markedly pink, the pulse rate was 110-120 beats per minute, the respiratory rate was 30-35 respirations per minute. A neurologist, invited for consultation, revealed an increase of tendon reflexes and tremor of fingers of stretched arms in all the patients.

All sick workers were released from their work, two persons with the most expressed signs were admitted to the plant hospital.

As a result of an investigation of this case of a mass acute disease carried on by a sanitation physician for occupational hygiene in the presence of the motor-testing shop manager and the chief of the safety engineering section of the plant before the beginning of the second shift, the following facts were revealed:

- All workers started their work in time at the beginning of the first shift.
- The workers were testers of tractor engines and operated engine-test beds, on which ready engines were tested in different modes of operation. Simultaneously, 10 engines are tested at the shop. One bed is operated by two workers.
- Usually the course of an operational check consists of the following stages: the engines are filled up with diesel fuel, started and work according to the program of testing in different modes (unloaded, usual and forced). The workers are directly near the test beds and with the help of special devices register the course of engine testing.

• The main unfavorable factors in this work are industrial noise (up to 95 dBA) and air pollution in the work area with exhaust fumes of engines in operation.
• The shop is equipped with plenum-exhaust ventilation. Besides, each bed has local ventilation for removing exhaust fumes from the air of the work area. In order to protect the organ of hearing, the workers use anti-noise earphones.
• On the day when there was the case of a mass disease of the employees, 30 minutes after the end of the dinner break the local ventilation on one of the beds went out of service. The work was not stopped though the employees were informed that it was inadmissible to carry out engine testing with faulty ventilation.
• The foreman of the test section did not inform the shop manager about the malfunction of the ventilation on one of the work places and allowed to go on with the testing.
• The work was stopped only one hour before the end of the shift when two workers who operated the engine-test bed with faulty ventilation and two workers who were engaged the nearby bed state of health had to leave their places of work and turn to the doctor of their plant outpatient clinic.

Task:
1) On the basis of the information given in the situational problem draw a record of investigation of the occupational poisoning according to the suggested form.
2) Make initial diagnosis of the occupational poisoning of the workers.
3) List the laboratory tests which should be made in order to specify the diagnosis of the given occupational poisoning.

Ministry of Public Health of Ukraine
Range .....
City .....
District .....

The act of sanitary investigation of occupational poisoning

This act was made 20 ... by doctor in hygiene of labor_____
_____
_____
At investigation were present _____
_____
_____
1.Name of the enterprise _____
_____
2.Address of the enterprise _____
3.Name of the shop _____
4.Date of rise of the disease 20 year _____

5.The circumstances of the occupational poisoning rise _____
_____
_____
_____
_____
_____
_____
_____
_____
6. The causes of the disease _____
_____
_____
_____
_____
_____
_____
_____
_____
7. The list of persons who fell ill _____
_____
_____
_____
_____
8. The measures of liquidation of the disease and terms of their fulfillment _____
_____
_____
_____
_____
_____
_____

The signatures of the participants of the investigation :

The doctor in hygiene of labor _____

The representative trade union _____

Give the conclusion by results of the decision of situational task
It is necessary to take into account
1. The beginning of the work _____
_____
2. The character of the work and equipment _____
_____
_____
_____
_____
_____
_____

3. The character of the technological process _____

4. The main unfavorable factors of the technological process _____

5. The sanitary measures at the work _____

6. Organization of labor at the industrial enterprise _____

7. The instructions about dangers of the work _____

8. The order of the administrative control _____

9.Data about breakdown in technological process _____
_____
_____
_____
_____
_____
_____
_____
10.Data about breakage of sanitary and technological equipment _____
_____
_____
_____
_____
_____
_____
_____
_____

Test questions

1. Classification of industrial poisons .
2. Basic ways how industrial poisons enter human organism.
3. The basic mechanism, which determins a toxic transformation of a human organism.
4. Destiny of industrial poisons in a human organism.
5. Cumulation of industrial poisons in a human organism and its significance in the development of occupational poisoning.
6. The ways of industrial poison elimination from a human organism.
7. Definition of marginal concentrations of industrial poison in the working area air.
8. The procedure of hygienic investigation of cases of occupational poisonings.
9. The documents filled in in the case of the occupational poisoning.

Signature of the Teacher_____ Signature of the Student _____

HYGIENE OF CHILDREN AND TEENAGERS

Date _____

Subject 24. METHODS OF STUDY OF CHILDRENS' HEALTH UNDER INFLUENCE OF ENVIRONMENTAL FACTORS. THE METHODS OF STUDY

Learning objective

- To strengthen the theoretical knowledge about environmental factors and conditions rhat influence the formation of children's health.
- To master the methods of study of the children and teenagers health and physical development.

Basics

You should know:
- Principal factors of environmental and social conditions of life, which influence the health of childern and adolescents.
- Main patterns of growth, development and peculiarities of morphological and functional state of the child's and teenager's organism.
- Methods of studying of physical development of children and teenagers

You should have the following skills:
- Determining the health groups, somatometric, somatoscopic and physiometric indices of the children's and adolescents' physical development.
- Measuring main parameters of physical development of a child and a teenager

CARD
of physical development of a child and a teenager (student)

1. General data
1.1. First and second name _____
1.2. Sex _____
1.3. Age (date of birth) _____
1.4. Nationality_____
1.5. Address_____
1.6. Place of studying _____
1.7. Data about the parents:
Mother's profession and place of mother's work_____
Father's profession and place of father's work_____
1.8. Living conditions (presence of a separate room, a separate bed, a desk for study
_____
_____
_____
1.9. Character of nourishment (good, bad, satisfactory) _____
1.10. Diseases at past time_____
_____
_____
1.11. Presence of chronic diseases at present _____
_____
_____

2. Somatoscopic data
2.1 Constitutional type_____
2.2 Skeleton_____
2.3 Development of the musculature_____
2.4 Fat deposit_____
2.5. Color of mucosa and skin, elasticity of skin _____
2.6. The form of the thorax_____
2.7. Posture_____
2.8 The form of the legs_____
2.9 Foot-print_____
2.10 Sexual development_____
3. Somatometric data
3.1. The stature
upright_____ in sitting position_____
3.2. The weight_____
3.3. The circumference of thorax
3.3.1 at maximum inspiration _____
3.3.2 at maximum expiration _____
3.3.3 at rest_____
3.4.The circumference of the head_____
4. Physiometric data
4.1. The vital capacity of lungs_____
4.2. The muscular force of hands: right _____ left _____
4.3. The muscular force of the trunk_____
4.4. Pulse_____
4.5. Blood pressure_____
4.6. Respiration (number in 1 min) _____
Conclusion_____
_____
_____

Test questions

1. The methods of studying of physical development of children and teenagers and their essence.
2. The methods of measurement of stature in children and teenagers (upright and sitting); the instruments used for these measurements.
3. The methods of measurement of circumference of the thorax, head, abdomen, etc; the instruments used for these purposes.
4. The methods of measurement of weight in children and teenagers; the instruments used for this purpose.
5. The methods of measurement of muscular force in the hands and trunk.
6. The methods of determination of somatoscopic parameters of the body (posture, development of muscles, the thorax form, development of fatty tissues, degree of sexual development)

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject № 25: METHODS OF ESTIMATION OF PHYSICAL DEVELOPMENT OF CHILDREN AND TEENAGERS.

Learning objective

- To strengthen theoretical knowledge about main criteria and indices of the children and adolescents health and development.
- To master methods of complex assessment of the children and adolescents health and physical development.

Basics

You should know :

- Methods of estimation of physical development of children and teenagers.

You should have the following skills:

- Estimating the physical development of a child and a group of children using different methods.

Situational task 1

To estimate the physical development of a 12 year-old girl using the method of "sigmal deviation". The stature of the girl is 138 cm, the weight is 40.6 kg, the circumference of the thorax is 61.89 cm

Parameter of physical development	Value for the child A	Standard value of parameter M	Difference Δ	σ	Sigmal deviation Δ / σ	Estimation
stature						
weight						
circumference of the thorax						

Conclusion_____

_____

_____

Situational task 2

Draw a profile of physical development for a nine year-old boy if it is known that he has deviation by stature + 1.3σ, by weight - 0.9σ, by circumference of the thorax - 1.2σ

	-3σ	-2σ	-1σ	M	+1σ	+2σ	+3σ
Stature							
Weight							
Circumference of the thorax							

Conclusion _____
_____
_____

Situational task 3

To give the hygienic estimations of physical development of a 7 (seven) year-old girl with the help of a "Regression scale by the stature".
Stature of the girl is 128 cm
Weight is 24 kg
Circumference of the thorax is 59 cm

Parameter of physical development	Value for the child A	Standard value of parameter by Regression scale M	Difference Δ	σ_R	Δ / σ_R	Estimation
stature						
weight						
circumference of the thorax						

Conclusion _____
_____
_____

Test questions

1. The methods of estimation of children's' and teenagers' physical development.
2. The essence of the "sigmal deviation" method.
3. The essence of the graphical method.
4. The essence of "regression scale" method by stature.
5. The essence of the complex method of estimation of physical development.
6. Groups of physical development of children and teenager, when you estimate them by the method of "sigmal deviation", by the method of "regression scale by stature", by the complex method

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject № 26: THE METHOD OF HYGIENIC ESTIMATION OF THE SECONDARY SCHOOL DESIGN, PROVISION AND MAINTENANCE.

Learning objective

- To strengthen the theoretical knowledge about the significance of optimal hygienic conditions maintenance during organization the educational process for preservation and strengthening of schoolchildren health, prevention of "school diseases".
- To become familiar with methods of hygienic assessment of the land plot and the building of educational establishment, its main premises (school class), inspection of conditions for the schoolchildren, the implementation and substantiation of hygienic recommendations for improvement of the training and education organization.
- To master the method of hygienic assessment of school furniture.

Basics

You should know:

- Peculiarities of main environmental factors and conditions of training and education, which influence the children and adolescents health.
- Health disorders and diseases caused by the influence of environmental conditions, training and education.
- Hygienic requirements to the land plot and the building, planning, sanitary and technical infrastructure (microclimate parameters, illumination, ventilation, water-supply etc.) of main premises of training and educational establishments.

You should have the following skills:

- Drawing up the plan of inspection of training premise and filling in appropriate papers (sanitary description, sanitary inspection act, hygienic conclusion).
- Researching the temperature regimen, humidity and air movement, illumination, calculating the required and actual ventilation volume and rate (air exchange rate).
- Determining main parameters of school furniture, carrying out the school desk marking.
- Working out and substantiating preventive recommendations concerning improvement of sanitary and hygienic conditions of the pupils.

Act
of sanitary and hygienic inspection of secondary school

I, student (doctor in hygiene of children and teenagers) _____
conducted sanitary - hygienic inspection of secondary school № ___ _____

1. General information

1.1 The name of secondary school_____

1.2 Address of secondary school_____

1.3 Number of pupils in the school_____

1.4 Radius of service of the school_____

2. Sanitary inspection of the situational plan of the school

1.5 2.1 Location of the school in the city _____
_____
_____

2.2 The surrounding objects and distance to them_____
_____
_____
_____
_____

2.3 Sources of the environmental pollution and distance to them _____
_____
_____
3. Sanitary inspection of the general plan of the school
3.1 The shape of the plot of the school_____
3.2 Length of the plot_____
3.3 Width of the plot_____
3.4 The area of the plot_____
3.5 Presence and names of zones on the territory of school plot_____
_____
_____
_____
_____
_____
3.6 Number of entrances to the territory of the school_____
3.7 The percentage of building of the territory_____
3.8 The persentage and location of green plantation _____
_____
_____
4. Hygienic character of school building
4.1. Distance of school building from
the road _____
"red line"_____
4.2. Orientation of the school building front_____
4.3. Number of stories_____
4.4. Location of the rooms on the stories_____
4.4.1 On the ground floor there are_____
_____
_____
_____
_____
4.4.2 on the first floor there are _____
_____
_____
_____
4.4.3 on the second floor there are _____
_____
_____
4.5. Water supply and sewerage system at the school_____
4.6. Heating system of the school building_____
4.7. Character of the corridor_____
4.7.1 type of the corridor ._____
4.7.2 length of the corridor _____
4.7.3 width of the corridor_____
4.7.4 the corridor area _____
4.7.5 the corridor area per one pupil _____

4.7.6 The characteristic of natural lighting of the corridor
- number of windows_____
- height of the window_____
- width of the window_____
- the window area _____
- area of all windows (without the frame) _____
- lighting coefficient in the corridor_____

4.8. Character of the class-room
4.8.1length of the class-room_____
4.8.2width of the class-room _____
4.8.3 the class-room area _____
4.8.4 the class-room area per one pupil_____
4.8.5 natural lighting in the class-room:
- number of windows_____
- height of the window_____
- width of the window_____
- window area _____
- area of all windows (without the frame) _____
- lighting coefficient _____

4.8.6 microclimate in the class- room:
- air temperature_____
- air humidity _____
- velocity of air movement_____

4.9. Characteristics of the gymnasium:
4.9.1 gymnasium is situated on_____
4.9.2 length the gymnasium _____
4.9.3 width the gymnasium _____
4.9.4 floor area _____
4.9.5 floor area per one pupil _____
4.9.6 lighting coefficient_____
4.9.7 artificial lighting_____
4.9.8 microclimate in the gymnasium:
- air temperature_____
- relative humidity_____
- velocity of air movement_____

4.9.9 cloak-room for the gymnasium _____
4.9.10 shower-bath for the gymnasium_____
4.10. Characteristics of the workshop_____
4.10.1length_____
4.10.2 width_____
4.10.3 floor area _____
4.10.4 floor area per one pupil_____
4.10.5microclimate in the workshop:
- air temperature_____
- air humidity_____
- velocity of air movement_____

5. Additional information _____
_____
_____
_____

6.Conclusion _____
_____
_____
_____
_____
_____
_____

Scheme of internal design of the school building

Test questions

1. Hygienic requirements to the placement of schools in the city.
2. Hygienic requirements to the plot area.
3. Hygienic requirements to a school building.
4. Set of rooms in a school and their location on the stories.
5. Hygienic requirements to a class-room and its equipment.
6. Hygienic requirements to a gymnasium and its equipment.
7. Hygienic requirements to a workshop and its equipment.
8. Organization of physical training in a school.
9. Organization of pupils' work in a workshop.

Signature of the Teacher_____ Signature of the Student _____

Date _____

Subject № 27: METHODS OF STUDYING AGE PSYCHICAL AND PHYSIOLOGICAL PECULIARITIES IN CHILDREN AND TEENAGERS. HYGIENIC ESTIMATION OF THE EDUCATIONAL AND UPBRINGING REGIMEN OF DIFFERENT CHILDREN'S' GROUPS.

Learning objective

- To become familiar with methods of studying age psychological and physiological peculairities of the organism of children and adolescents.
- To master the method of examination of children's functional preparedness to studying at school.
- To master methods of making hygienic assessment of day regimen and time-table for different age pupils.
- To become acquainted with the method of hygienic assessment of organization of the pupils' extra-curricular activities and free time.

Basics

You should know:

- Anatomical and physiological, psychological and physiological peculiarities of the child and adolescent organism of different age and sex.
- Medical, physiological, psychological and pedagogic assessment criteria of the child development level.
- Methods of studying of fucntional state of the child and adolescent organism.
- Health disorders and diseases caused by irrational organization of training and education.
- Hygienic requirements to organization of training and education, making up of time-table, organization and carrying out of the lesson, organization of the pupils' extra-curricular activities aand free time.

You should have the following skills:

- Identifying psychological and physiological peculiarities of the child's and adolescent's organism depending on age.
- Carrying out the hygienic assessment of functional preparedness of children to training at school.
- Performing the hygienic assessment of day regimen, time-table, school textbooks and manuals, organization and carrying out of the lesson and pupils' extra-curricular activities and free time.

The scheme of hygienic estimation of the school time-table

1. The number of school shifts_____
2. The beginning of classes of the first shift_____
3. The end of classes of the first shift _____
4. The beginning of classes of the second shift_____
5. The end of the classes of the second shift_____

(You should calculate the end of the classes by yourself. For this purpose, you should sum up the time of all lessons and all breaks.)

6. The number of breaks and their duration_____
7. The number of lessons a day: minimal _____ maximal _____
8. The number of lessons a week_____
9. Study time a day: minimal _____ maximal _____
10. Study time a week_____
11. The number of lessons of physical training a week_____

On what days and at what time are there the lessons of physical training?_____

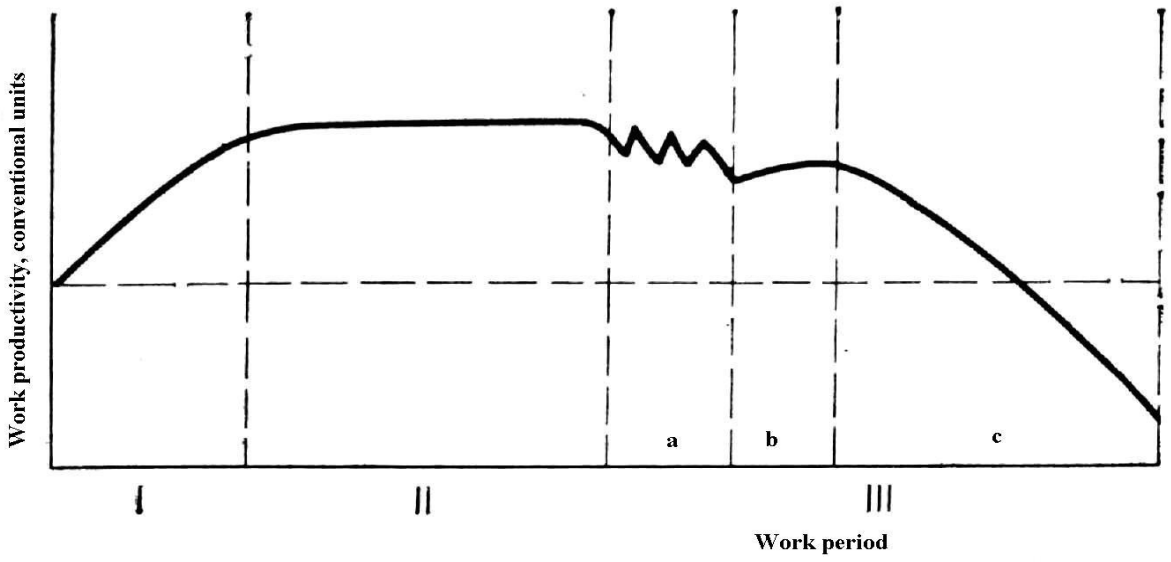
_____

12. The number of industrial arts lessons a week_____
13. On what days and at what time are there the lessons of labor?_____
_____
10. The number of double lessons_____
On what day, at what time and in what subjects are these double lessons a week?
_____
_____
_____

School time-table

Monday	
1	
2	
3	
4	
5	
6	
Tuesday	
1	
2	
3	
4	
5	
6	
Wednesday	
1	
2	
3	
4	
5	
6	

Thursday	
1	
2	
3	
4	
5	
6	
Friday	
1	
2	
3	
4	
5	
6	



Physiological curve of working capacity

(I – period of work initialization; II – period of high constant working capacity, III – period of decreasing of working capacity; a –zone of partial compensation; b – zone of final outburst; c – zone of progressive fall of working capacity)

The “Rank scale” of school subjects difficulty after Sivkov

Name of subject	**Level of difficulty in points**
Mathematics, Russian for national schools	**11**
Foreign languages	**10**
Physics and chemistry	**9**
History	**8**
Native language and literature	**7**
Geography and biology	**6**
Physical training	**5**
Drafting	**4**
Industrial arts	**3**
Drawing	**2**
Singing	**1**

15. Draw a graphs of distribution of school subjects according to the «Rank scale» of school subjects difficulty " for every weekday.

Monday

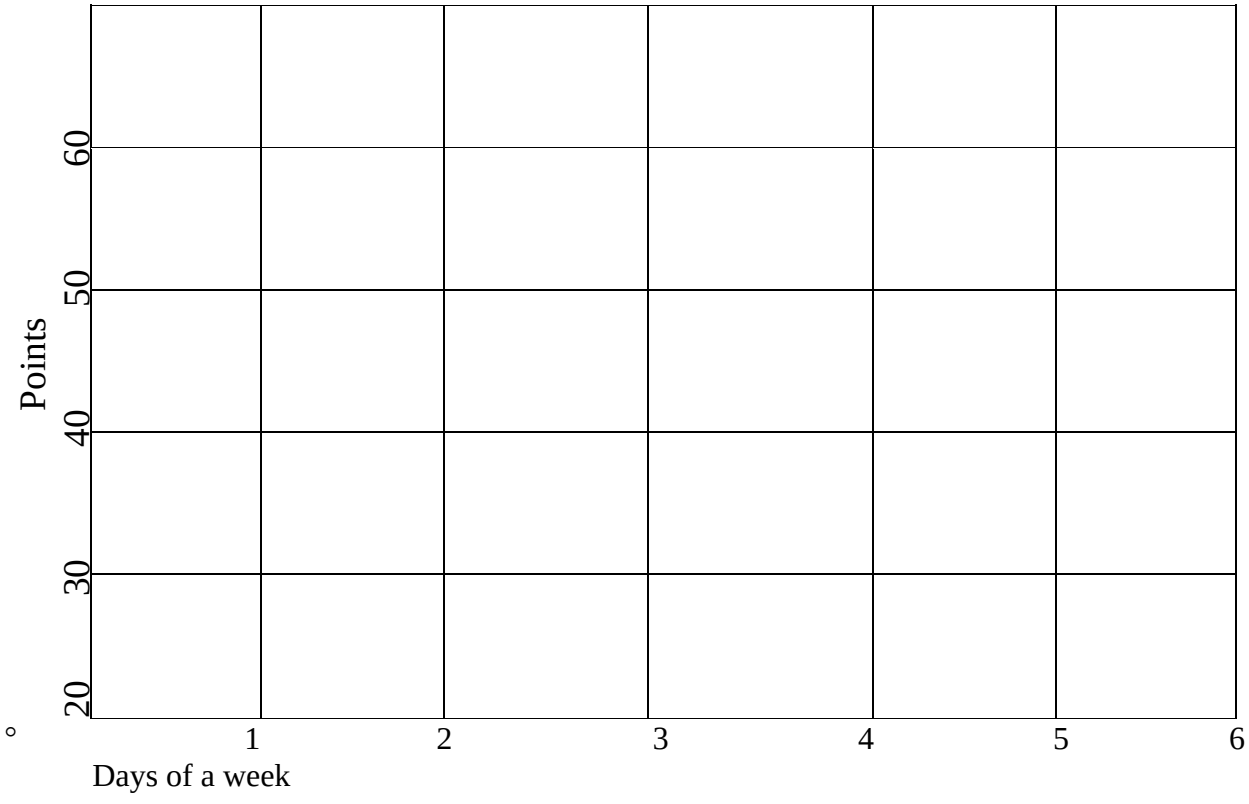
Tuesday

Wednesday

Thursday

Friday

16. Distribution of school subjects according to the «Rank scale» of their difficulty for a week



Conclusion

Test questions

1. The physiological curve of the working ability and its substantiation.
2. The main peculiarities of educational process at school.
3. Regimen of a day. Principles of the day regimen construction.
4. Hygienic requirements to the day regimen.
5. Hygienic requirements to the school time-table.
6. The "Rank scale" of difficulty of the school subjects.

Signature of the Teacher_____ Signature of the Student _____

INFORMATION AND REFERENCE MATERIALS

Determination of the relative humidity based on the Assmann psychrometer data, %

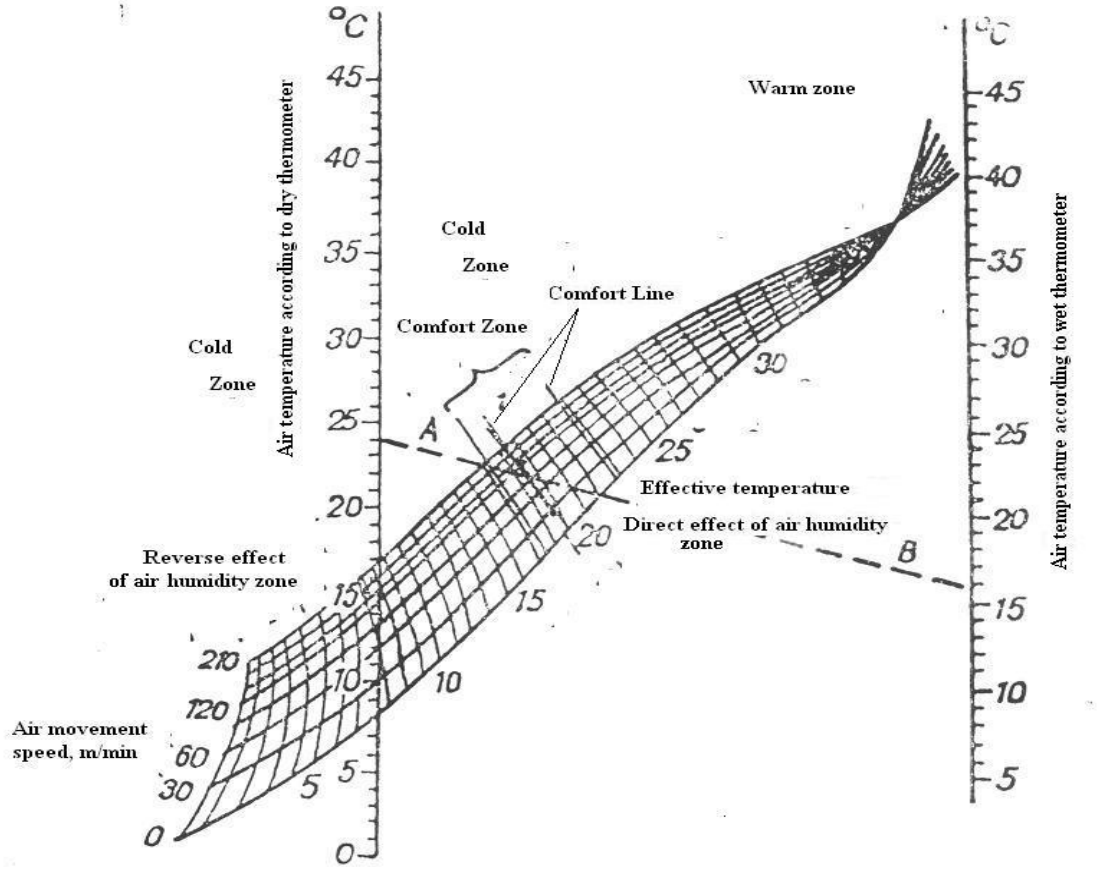
Dry thermometer reading,° C	Wet thermometer reading, ° C													
	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0
16.0	**46**	**54**	**63**	**71**	**81**	**90**	**100**							
17.0	**39**	**47**	**55**	**64**	**72**	**81**	**90**	**100**						
18.0	**34**	**41**	**49**	**56**	**65**	**73**	**82**	**91**	**100**					
19.0	**29**	**36**	**43**	**50**	**58**	**66**	**74**	**82**	**91**	**100**				
20.0	**24**	**30**	**37**	**44**	**52**	**59**	**66**	**74**	**83**	**91**	**100**			
21.0	**20**	**26**	**32**	**39**	**46**	**53**	**60**	**67**	**75**	**83**	**91**	**100**		
22.0	**16**	**22**	**28**	**34**	**40**	**47**	**57**	**64**	**72**	**80**	**84**	**91**	**100**	
23.0	**13**	**18**	**24**	**30**	**36**	**42**	**48**	**55**	**62**	**69**	**76**	**84**	**92**	**100**
24.0		**15**	**20**	**26**	**31**	**37**	**43**	**49**	**56**	**63**	**70**	**77**	**84**	**92**
25.0			**17**	**22**	**27**	**33**	**38**	**44**	**50**	**57**	**63**	**70**	**77**	**84**
26.0			**14**	**19**	**24**	**29**	**34**	**40**	**46**	**52**	**58**	**64**	**71**	**77**
27.0				**16**	**21**	**25**	**30**	**36**	**41**	**47**	**52**	**58**	**65**	**71**
28.0				**13**	**17**	**22**	**26**	**31**	**36**	**42**	**46**	**52**	**58**	**65**
29.0					**14**	**18**	**22**	**27**	**33**	**37**	**42**	**46**	**52**	**58**
30.0						**15**	**19**	**24**	**29**	**33**	**37**	**40**	**46**	**52**
31.0							**16**	**21**	**25**	**29**	**33**	**36**	**40**	**46**

Table of tangents

$\mathrm{tg}\,\alpha$	$\angle\alpha^0$	$\mathrm{tg}\,\alpha$	$\angle\alpha^0$	$\mathrm{tg}\,\alpha$	$\angle\alpha^0$	$\mathrm{tg}\,\alpha$	$\angle\alpha^0$
0.0175	1	0.2867	16	0.6009	31	1.0355	46
0.0349	2	0.3057	17	0.6249	32	1.1106	48
0.0524	3	0.3249	18	0.6494	33	1.1918	50
0.0699	4	0.3443	19	0.6745	34	1.2799	52
0.0875	5	0.3640	20	0.7002	35	1.3764	54
0.1051	6	0.3839	21	0.7265	36	1.4826	56
0.1228	7	0.4040	22	0.7536	37	1.6003	58
0.1405	8	0.4245	23	0.7813	38	1.732	60
0.1584	9	0.4452	24	0.8098	39	1.881	62
0.1763	10	0.4663	25	0.8391	40	2.050	64
0.1944	11	0.4877	26	0.8693	41	2.246	66
0.2126	12	0.5095	27	0.9004	42	2.475	68
0.2309	13	0.5317	28	0.9325	43	2.747	70
0.2493	14	0.5543	29	0.9657	44	3.078	72
0.2679	15	0.5774	30	1.0000	45	3.487	74

Calculations for the formula of the air movement speed less than 1 m/sec considering the allowance for temperature

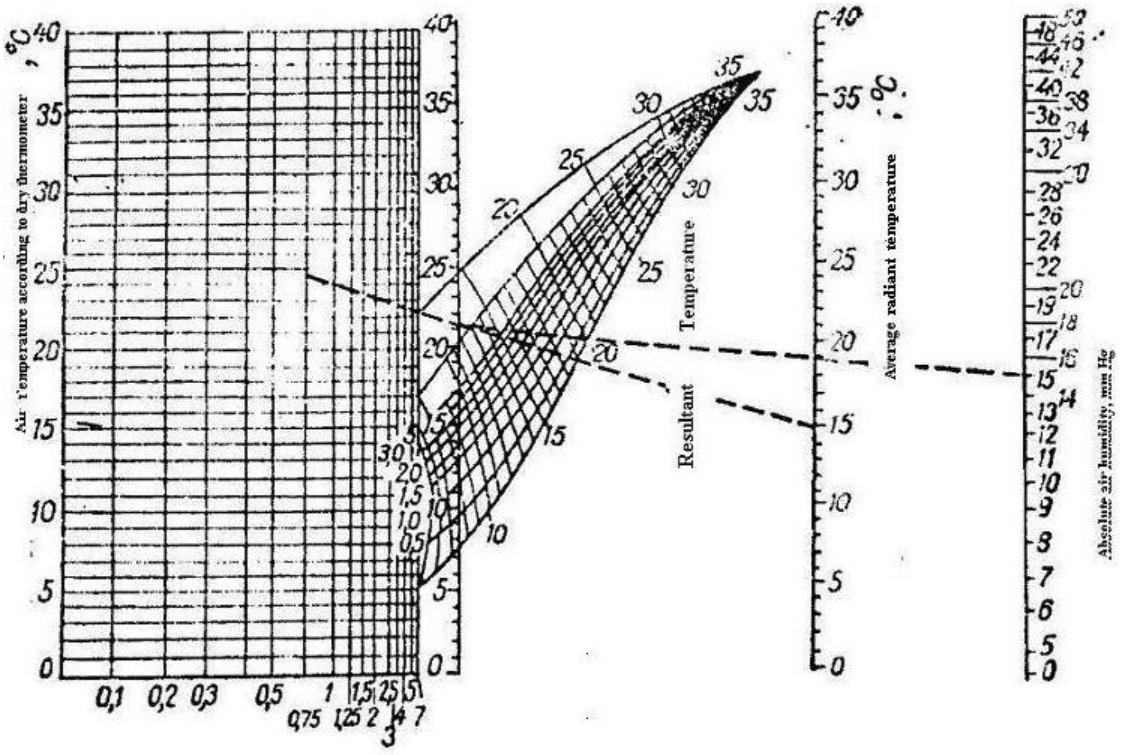
H/Q	*Air movement speed in m/sec. at the temperature in °C*							
	10	12.5	15	17.5	20	22,5	25	26
0.27	-	-	-	-	0.044	0.047	0.051	0.059
0.28	-	-	-	0.049	0.051	0.061	0.070	0.074
0.29	0.041	0.050	0.051	0.060	0.067	0.076	0.085	0.089
0.30	0.051	0.060	0.065	0.073	0.082	0.091	0.101	0.104
0.31	0.061	0.070	0.079	0.088	0.098	0.107	0.116	0.119
0.32	0.076	0.085	0.094	0.104	0.113	0.124	0.136	0.140
0.33	0.091	0.101	0.110	0.119	0.128	0.140	0.153	0.159
0.34	0.107	0.115	0.129	0.139	0.148	0.160	0.174	0.179
0.35	0.127	0.136	0.145	0.154	0.167	0.180	0.196	0.203
0.36	0.142	0.151	0.165	0.19	0.192	0.206	0.220	0.225
0.37	0.163	0.172	0.185	0.198	0.212	0.226	0.266	0.245
0.38	0.183	0.197	0.210	0.222	0.239	0.249	0.240	0.273
0.39	0.208	0.222	0.232	0.244	0.257	0.274	0.266	0.301
0.40	0.229	0.242	0.256	0.269	0.287	0.305	0.293	0.330
0.41	0.254	0.267	0.282	0.299	0.314	0.330	0.323	0.364
0.42	0.280	0.293	0.311	0.325	0.343	0.361	0.349	0.386
0.43	0.310	0.324	0.342	0.356	0.373	0.392	0.379	0.417
0.44	0.340	0.354	0.368	0.385	0.401	0.417	0.410	0.449
0.45	0.366	0.381	0.398	0.412	0.429	0.449	0.445	0.478
0.46	0.396	0.415	0.429	0.446	0.465	0.483	0.471	0.508
0.47	0.427	0.445	0.464	0.482	0.500	0.518	0.501	0.544
0.48	0.468	0.480	0.499	0.513	0.531	0.551	0.537	0.579
0.49	0.503	0.516	0.535	0.556	0.571	0.590	0.572	0.615
0.50	0.539	0.557	0.571	0.589	0.604	0.622	0.608	0.651
0.51	0.574	0.593	0.607	0.628	0.648	0.666	0.640	0.691
0.52	0.615	0.633	0.644	0.665	0.683	0.701	0.684	0.727
0.53	0.656	0.674	0.688	0.705	0.724	0.742	0.720	0.768
0.54	0.696	0.715	0.729	0.746	0.764	0.783	0.760	0.808
0.55	0.737	0.755	0.770	0.790	0.827	0.827	0.801	0.851
0.56	0.788	0.801	0.815	0.833	0.851	0.867	0.844	0.894
0.57	0.834	0.852	0.867	0.882	0.898	0.915	0.933	0.940
0.58	0.879	0.898	0.912	0.929	0.941	0.959	0.972	0.977
0.59	0.930	0.943	0.957	0.971	0.985	1.001	1.018	1.023
0.60	0.981	0.994	1.008	1.022	1.033	1.044	1.056	1.060



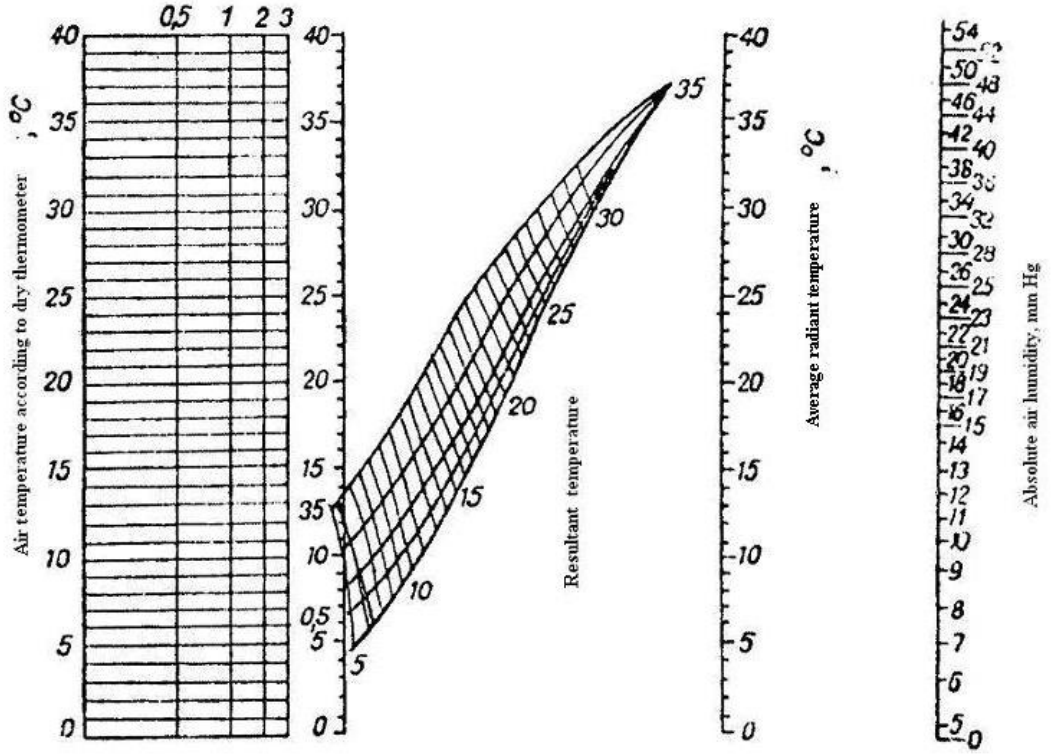
Nomogram of the effective temperature determination

Standards of the general artificial illumination

Premises	The smallest illumination, lux	
	Luminescent lamps	Incandescent lamps
Rooms and kitchens of dwelling houses	75	30
Classrooms	300	150
Rooms of technical drawing	500	300
School workshops	300	150
Public reading halls	300	150
Operating and sectional rooms		200
Delivery room, dressing ward, manipulation room	400	200
Pre-operative room	300	150
Surgeon's, obstetritian-gynecologist's, pediatrician's, infectionist's, dentist's room	500	200
X-ray room	-	150
Functional diagnostics room	-	150
Wards for newly-born babies, postoperative rooms	150	75



a



b

Nomogram of the resultant temperature determination

(a – during light work; b – during hard work)

Coefficients for conversion the air volumes to their values in standard conditions

Tempe-rature, °C	*1 + αt*	*Tempe-rature, °C*	*1 + αt*
- 4	0.98535	16	1.0586
- 3	0.9890	17	1.0623
- 2	0.9927	18	1.0660
-1	0.9963	19	1.0696
0	1.000	20	1.0733
1	1.0037	21	1.0770
2	1.0073	22	1.0806
3	1.0010	23	1.0843
4	1.0147	24	1.0880
5	1.0183	25	1.0917
6	1.0220	26	1.0953
7	1.0257	27	1.0990
8	1.0293	28	1.1027
9	1.0330	29	1.1063
10	1.0367	30	1.1100
11	1.0403	31	1.1137
12	1.0440	32	1.1173
13	1.0476	33	1.1210
14	10513	34	1.1247
15	10550	35	1.1283

Atmospheric pressure, Hg mm.	$\frac{B}{760}$	*Atmospheric pressure, Hg mm.*	$\frac{B}{760}$
741	0.975	761	1.0013
742	0.976	762	1.0026
743	0.978	763	1.0039
744	0.979	764	1.0053
745	0.980	765	1.0066
746	0.982	766	1.0079
747	0.983	767	1.0092
748	0.984	768	1.0105
749	0.986	769	1.0118
750	0.987	770	1.0132
751	0.988	771	1.0145
752	0.989	772	1.0158
753	0.991	773	1.0171
754	0.992	774	1.0184
755	0.993	775	1.0197
756	0.995	776	1.0211
757	0.996	777	1.0224
758	0.997	778	1.0237
759	0.999	779	1.0250
760	1.000	780	1.0263

Air temperature in dwelling

(for cold period of year)

Premises	Air temperature, ºC
Living room (in flat and hostel)	18-20
Kitchen	18
Bath-room and shower-stall	25
Cloak-room	16-18
Toilet with bath-room	25
Wash-room	18
Hall, corridor	16
Premises for rest and study in a hostel	18
Isolation ward in a hostel	20
Administrative room in a hostel	18

Hygienic Standards of drinking water quality
according State Sanitary Rules and Norms 2.2.4-171-10
"Hygienic Requirements of Drinking water destined for person' consumption"

1. Sanitary-chemical indices

Organoleptic and physical properties

Index	Hygienic norm	
	for water-pipe	for wells and captation of springs
Smell (at 20° C and 60° C)	not more than **2** points	not more than **3** points
Taste and aftertaste (at 20° C)	not more than **2** points	not more than **3** points
Color quantity	not more than **20°**	not more than **35°**
Feculence	not more than **1.0** NUF (not more than **2.6** NUF for underground water)	not more than **3.5** NUF

Physico-chemical indices

Index	Hygienic norm	
	for water-pipe	for wells and captation of springs
pH	**6,5-8,5**	**6,5-8,5**
Iron (Fe)	not more than **0.2** mg/dm^3	not more than **1.0** mg/dm^3
General hardness	not more than **7.0** mmol/ dm^3	not more than **10.0** mmol/ dm^3
Manganese (Mn)	not more than **0.05** mg/dm^3	not more than **0.5** mg/dm^3
Copper (Cu^{2+})	not more than **1.0** mg/dm^3	not determined
Polyphosphates (by PO_4^{3-})	not more than **3.5** mg/dm^3	not determined
Sulphates (SO_4^{2-})	not more than **250** mg/dm^3	not more than **500** mg/dm^3
Dry residue	not more than **1000** mg/dm^3	not more than **1500** mg/dm^3
Residual uncombined chlorine	not more than **0.5** mg/dm^3	not more than **0.5** mg/dm^3
Chlorides (Cl^-)	not more than **250** mg/dm^3	not more than **350** mg/dm^3
Zinc (Zn^{2+})	not more than **1.0** mg/dm^3	not determined

Microbiological indices

Index	Hygienic norm	
	for water-pipe	for wells and captation of springs
Total microbial number	not more than **100** CFU/cm^3	not determined
E.coli	absence in **100** cm^3	absence in **100** cm^3
Entherococci	absence in **100** cm^3	not determined
Pseudomonas aeruginosa	absence in **100** cm^3	not determined
Pathogenic entherobacteria	absence in **1** dm^3	absence in **1** dm^3
Coliphage	absence in **100** cm^3	absence in **100** cm^3
Entheroviruses, adenoviruses and so on	absence in **100** cm^3	absence in **100** cm^3
Pathogenic intestinal protozoa, intestinal helmints	absence in **50** dm^3	absence in **50** dm^3

Toxicological indices

Index	Hygienic norm	
	for water-pipe	for wells and captation of springs
Aluminum (Al)	not more than **0.2** mg/dm^3	not determined
Ammonia	not more than **0.5** mg/dm^3	not more than **2.6** mg/dm^3
Cadmium (Cd)	not more than **0.001** mg/dm^3	not determined
Silicon (Si)	not more than **10** mg/dm^3	not determined
Arsenic (As)	not more than **0.01** mg/dm^3	not determined
Molybdenum (Mo)	not more than **0.07** mg/dm^3	not determined
Nitrates (by NO_3^-)	not more than **50** mg/dm^3	not more than **50** mg/dm^3
Nitrites (NO_2^-)	not more than **0.5** mg/dm^3	not more than **3.3** mg/dm^3
Residual ozone (O_3)	**0.1-0.3** mg/dm^3	not determined
Mercury (Hg)	not more than **0.0005** mg/dm^3	not determined
Lead (Pb)	not more than **0.01** mg/dm^3	not determined
Fluoride (F^-)	I and II climatic zone - not more than **1.5** mg/dm^3 III climatic zone - not more than **1.2** mg/dm^3 IV climatic zone - not more than **0.7** mg/dm^3	not more than **1.5** mg/dm^3
Residual polyacrylamide	not more than **2.0** mg/dm^3	not determined
Formaldehyde	not more than **0.05** mg/dm^3	not determined
Chloroform	not more than **60** mg/dm^3	not determined
Permanganate oxidability	not more than **5.0** mg/dm^3	not more than **5.0** mg/dm^3

Scale for assessment of sanitary state of soil*

Danger level	Level of pollution	Criteria of epidemic safety				
		Coli titer	Anaerobe titer	Number of eggs of helminthes in 1 kg of soil	Number of larvae and chrysalides of flies on 0.25 m^2	Sanitary number of Khlebnikoff'
Safe	Pure	1.0 and more	0.1 and more	0	0	0.98-1.0
Relatively safe	Slightly polluted	1.0-0.01	0.1-0.01	less than 10	single specimen	0.86-0.98
Dangerous	Polluted	0.01-0.001	0.01-0.0001	11-100	10-25	0.70-0.86
Very dangerous	Heavily polluted	0.001 and less	0.0001 and less	more than 100	25 and more	<0.70

*Under condition of soil sampling in the depth of 0-20 cm

Professional groups of workers

1st group	**Workers occupied with mental work** Engineers, teachers, physicians (except surgeons), chiefs of enterprises, scientific workers, secretaries, students, managers of industrial enterprises, literature workers, businessmen, controllers, laboratory assistants.
2nd group	**Workers occupied with light physical work** Coaches, workers of automatic industrial process, clothing-industry workers, agronomists, salespeople, stock-breeders, junior nurses, trainers, nurses.
3rd group	**Workers occupied with not hard work** Drivers, cooks, shoe-makers, surgeons, fitters, adjusters, chemists, textile-workers, workers of public nutrition, salespeople in food shops, water-transport workers, railway men.
4th group	**Workers occupied with hard physical work** Dockers, builders, metallurgists, riggers, miners, steel-makers, foundry men.

Daily caloric value and quantity of proteins, fats and carbohydrates for different professional groups of population (men)

Professional groups	Coefficient of physical activity	Age (years)	Caloricity Kcal	Proteins (g)		Fats(g)	Carbohydrates (g)
				Total	Animal origin		
I	1.4	18-29	2450	67	37	68	392
		30-39	2300	63	35	64	368
		40-59	2100	58	32	58	336
II	1.6	18-29	2800	77	42	78	448
		30-39	2650	73	40	74	424
		40-59	2500	69	38	69	400
III	1.9	18-29	3300	91	50	92	528
		30-39	3150	87	48	88	504
		40-59	2950	81	45	82	472
IV	2.3	18-29	3900	107	59	100	624
		30-39	3700	102	56	100	592
		40-59	3500	96	53	97	560

Daily caloric value and quantity of proteins, fats and carbohydrates for different professional groups of population (women)

Professional groups	Coefficient of physical activity	Age (years)	Caloricity Kcal	Proteins (g)		Fats(g)	Carbohydrates(g)
				Total	Animal origin		
I	1.4	18-29	2000	55	30	56	320
		30-39	1900	52	29	53	304
		40-59	1800	50	28	51	288
II	1.6	18-29	2200	61	34	62	362
		30-39	2150	59	32	60	344
		40-59	2100	58	32	59	336
III	1.9	18-29	2600	72	40	73	416
		30-39	2550	72	39	71	408
		40-59	2500	69	38	70	400
IV	2.2	18-29	3050	84	46	85	488
		30-39	2950	81	45	82	472
		40-59	2850	78	43	79	456

Daily need of vitamins for different professional groups of population (men)

Professional groups	Coefficient of physical activity	Vitamins									
		E	**D**	**A**	**B_1**	**B_2**	**B_6**	**PP**	***Folat***	**B_{12}**	**C**
		mg	mcg	mcg	mg	mg	mg	mg	mcg	mcg	mg
I	1.4	15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
II	1.6	15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
III	1.9	15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
		15	2.5	1000	1.6	2.0	2.0	22	250	3	80
IV	2.3	15	2.5	1000	1.6	2.0	2.0	22	250	3	80

Daily need of vitamins for different professional groups of population (women)

Professional groups	Coefficient of physical activity	Vitamins									
		E	**D**	**A**	**B_1**	**B_2**	**B_6**	**PP**	***Folat***	**B_{12}**	**C**
		mg	Mcg	mcg	mg	mg	mg	mg	mcg	mcg	mg
I	1.4	15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
II	1.6	15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
III	1.9	15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
		15	2.5	1000	1.3	1.6	1.8	16	200	3	70
IV	2.2	15	2.5	1000	1.3	1.6	1.8	16	200	3	70

Daily need of mineral substances for the different professional groups of population (men)

Professional groups	Coefficient of physical activity	Mineral substances							
		Ca mg	P mg	Mg mg	Fe mg	F mg	Zn mg	I mg	Se mcg
I	1.4	1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
II	1.6	1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
III	1.9	1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70
IV	2.3	1200	1200	400	15	0.75	15	0.15	70
		1200	1200	400	15	0.75	15	0.15	70

Daily need of mineral substances for the different professional groups of population (women)

Professional groups	Coefficient of physical activity	Mineral substances							
		Ca	P	Mg	Fe	F	Zn	1	Se
		mg	mg	mg	mg	mg	mg	mg	mcg
I	1.4	1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50
II	1.6	1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15.	50
		1100	1200	350	17	0.75	12	0.15	50
III	1.9	1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50
IV	2.2	1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50
		1100	1200	350	17	0.75	12	0.15	50

Chemical composition of same food products

(per 100 g of products)

Products	Proteins, g	Fats, g	Carbo-hydrates, g	Caloric value	Vitamins, mg					Minerals, mg			
					A	B_1	B_2	PP	C	Ca	Mg	P	Fe
Rice	7.3	2.0	63.1	284	-	0.52	0.12	3.82	-	66	96	328	2.6
Peas	23.0	1.2	53.3	303	-	0.81	0.15	2.20	-	115	107	329	9.4
Haricot beans	22.3	1.7	54.5	309	-	0.50	0.18	2.10	-	150	103	541	12.4
Flour wheaten the highest quality	10.3	0.9	74.2	327	-	0.17	0.08	1.20	-	18	16	86	1.2
Flour wheaten the1 sort	10.6	1.3	73.2	329	-	0.25	0.12	2.20	-	24	44	115	2.1
Rye flour	8.9	1.7	73.0	325	-	0.25	0.13	1.02	-	34	60	189	3.5
Buckwheat (serial)	9.5	1.9	72.2	326	-	0.42	0.17	3.76	-	48	-	253	4.9
Millet	12.0	2.9	69.3	334	-	0.62	0.04	1.55	-	27	101	233	7.0
Macaroni highest quality	10.4	0.9	75.2	332	-	0.17	0.08	1.21	-	18	16	87	1.2
Macaroni I sort	10.7	1.3	74.2	333	-	0.25	0.12	2.22	-	24	45	116	2.1
Rye-bread	6.5	1.0	40.1	190	-	0.18	0.11	0.67	-	38	49	156	2.6
Wheaten bread II sort	8.1	1.2	46.6	220	-	0.23	0.10	1.92	-	32	53	128	2.4
Long loaf wheaten of I sort biscuit highest quality	7.9	1.0	51.9	236	-	0.16	0.08	1.59	-	25	35	86	1.6
Sugar biscuit highest quality	7.5	11.8	74.4	417	traces	0.08	0.08	0.70	-	20	13	69	1.0
Ban biscuit	10.4	5.2	76.2	376	traces	0.08	0.08	0.75	-	43	22	122	1.8
Puff-pastry with cream	5.4	38.6	46.4	544	0.15	0.04	0.05	0.51	-	37	4	58	0.6
Sponge cake	4.7	20.0	49.8	386	0.07	0.10	0.10	0.50	-	45	16	76	1.0
Pasteurized milk	2.8	3.2	4.7	58	0.02	0.03	0.13	0.10	1.0	121	14	91	0.1
Cream with fat of 20%	2.8	20.0	3.6	205	0.15	0.03	0.11	0.10	0.3	86	8	60	0.2

Products	Proteins, g	Fats, g	Carbo-hydrates, g	Caloric value	Vitamins, mg					Minerals, mg			
					A	B_1	B_2	PP	C	Ca	Mg	P	Fe
Fatty curds (cottage cheese)	14.0	18.0	1.3	226	0.10	0.05	0.30	0.30	0.5	150	23	217	0.4
Not fatty curds (cottage cheese)	18.0	0.6	1.5	86	traces	0.04	0.25	0.64	0.5	176	24	224	0.3
Fatty kefir	2.8	3.2	4.1	59	0.02	0.03	0.17	0.14	0.7	120	14	95	0.1
Not salt butter	0.6	82.5	0.9	748	0.50	traces	0.01	0.10	-	22	3	19	0.2
Russian cheese	23.4	30.0	-	371	0.26	0.04	0.30	0.30	1.6	1000	47	544	0.6
Cheese with fat of 40% (processed)	23.0	19.0	-	270	-	0.01	0.35	-	-	686	-	-	-
Ice cream	3.3	10.0	19.8	176	0.04	0.03	0.20	0.05	0.6	148	22	107	0.1
Margarine	0.3	82.3	1.0	746	0.4	traces	0.01	0.02	traces	12	1	8	traces
Mayonnaise	3.1	67.0	2.6	627	-	-	-	-	-	28	11	50	
Mutton of the I category	16.3	15.3	-	203	-	0.08	0.14	2.5	traces	9	18	178	2.0
Beef of the I category	18.9	12.4	-	187	traces	0.06	0.15	2.8	traces	9	21	198	2.6
Rabbit meat	20.7	12.9	-	199	-	0.08	0.10	4.0	-	7	25	246	4.4
Veal	19.7	1.2	-	90	traces	0.14	0.23	3.3	traces	11	24	189	1.7
Doctor’s sausage	13.7	22.8	-	260	-	-	-	-	-	29	22	178	1.7
Liver sausage	12.2	28.0	-	301	-	0.25	0.18	2.47	-	7	17	146	1.7
Chickens of the I	18.2	18.4	0.7	241	0.07	0.07	0.15	3.70	-	6	27	228	3.0
and of the II category	20.8	8.8	0.6	163	0.07	0.07	0.14	3.60	-	20	32	298	3.0
Gooses of the I	15.2	39.0	-	412	0.02	0.08	0.23	2.20	-	12	35	154	3.0
and of the II category	17.0	27.0	-	317	0.02	0.09	0.26	2.60	-	20	40	221	3.0
Ducks of the I	15.8	38.0	-	405	0.05	0.12	0.17	2.80	-	23	25	200	3.0
and of the II category	17.2	24.2	-	287	0.05	0.18	0.19	3.0	-	30	35	218	3.0
Chicken eggs	12.7	11.5	0.7	157	0.35	0.07	0.44	0.19		55	54	185	2.7
Far-eastern flat-fish	15.7	3.0	-	90	-	0.06	0.11	1.0	traces	-	-	-	-

Products	Proteins, g	Fats, g	Carbo-hydrates, g	Caloric value	Vitamins, mg					Minerals, mg			
					A	B_1	B_2	PP	C	Ca	Mg	P	Fe
Bream	17.1	4.1	-	105	0.03	0.12	0.10	2.0	-	26	28	-	0.3
Burbot	18.8	0.6	-	81	-	-	-	-	-	32	64	191	1.4
Marine perch	17.6	5.2	-	117	-	0.11	0.12	1.6	traces	36	21	213	0.5
Fatty Atlantic herring	17.7	19.5	-	242	0.03	0.03	0.30	3.90	2.7	102	30	278	0.9
Hake	16.6	2.2	-	86	-	0.12	0.10	1.1	3.2	20	17	-	-
Pike	18.8	0.7	-	82	-	0.11	0.14	1.0	1.6	-	-	-	-
Tinned foods	18.3	23.3	-	283	-	0.03	-	2.8	-	-	-	-	-
Tinned foods „Atlantic mackerel in oil”	13.1	25.1	-	278	-	-	-	-	-	-	-	-	-
Sprats in oil	17.4	32.4	0.4	364	-	0.05	0.12	1.0	-	297	53	348	-
Green peas	5.0	0.2	13.3	72	-	0.34	0.19	2.0	25.0	26	38	122	0.7
Potatoes	2.0	0.1	19.7	83	-	0.12	0.05	0.9	20.0	10	23	58	0.9
Spring onions (leaf)	1.3	-	4.3	22	-	0.02	0.10	0.3	30.0	121	18	26	1.0
Carrot yellow	1.3	0.1	7.0	33	-	0.16	0.02	-	5.0	46	36	60	1.4
Cucumbers (subsoil)	0.8	-	3.0	15	-	0.03	0.04	0.2	10.0	23	14	42	0.9
A green sweet pepper	1.3	-	4.7	23	-	0.06	0.10	0.6	150.0	6	10	25	0.8
A parsley (greens)	3.7	-	8.1	45	-	0.05	0.05	0.7	150.0	245	85	95	1.9
Garden radish	1.2	-	4.1	20	-	0.01	0.04	0.1	25.0	39	13	44	1.0
Lettuce	1.5	-	12.2	14	-	0.03	0.08	0.6	15.0	49	17	34	0.9
Beetroot	1.7	-	10.8	48	-	0.02	0.04	0.2	10.0	37	43	43	1.4
Tomatoes (subsoil)	0.6	-	4.2	19	-	0.06	0.04	0.5	25.0	14	20	26	1.5
Garlic	6.5	-	21.2	106	-	0.08	0.08	1.0	10.0	90	30	140	1.5
Sorrel	1.5	-	5.3	28	-	0.19	0.10	0.3	43.0	47	85	90	2.0
Pickled cabbage	0.8	-	1.8	14	-	-	-	-	20.0	51	17	34	1.3
Pickled cucumbers	2.8	-	1.3	19	-	-	-	-	-	25	-	20	1.2
Mushrooms	0.9 27.6	0.4 68	3.2 10.0	19 209	- -	0.02 0.27	0.27 3.23	4.6 40.4	11.0 150.0	27 184	- -	89 606	5.2 35.0
Water-melon	0.7	-	9.2	38	-	0.04	0.03	0.24	7.0	14	224	7	1.0

Products	Proteins, g	Fats, g	Carbo-hydrates, g	Caloric value	Vitamins, mg					Minerals, mg			
					A	B_1	B_2	PP	C	Ca	Mg	P	Fe
Pumpkin	1.0	-	6.5	29	-	0.05	0.03	0.5	8.0	40	14	25	0.8
Cherry	0.8	-	10.7	42	-	0.03	0.03	0.4	15.0	37	26	30	1.4
	1.1	-	12.3	52	-	0.01	0.01	0.4	15.0	33	24	28	1.8
Pear	0.4	-	10.7	42	-	0.02	0.03	0.1	5.0	19	12	16	2.3
Gargen plum	0.8		9.9	43	-	0.06	0.04	0.6	10.0	28	17	27	2.1
Apples	0.4	-	11.3	46	-	0.01	0.03	0.3	13.0	16	9	11	2.2
Oranges	0.9	-	8.4	38	-	0.04	0.03	0.2	60.0	34	13	23	0.3
Lemons	0.9	-	3.6	31	-	0.04	0.02	0.1	40.0	40	12	22	0.6
Grapes	0.4	-	17.5	69	-	0.05	0.02	0.3	6.0	45	17	22	0.6
Strawberries	1.8	-	8.1	41	-	0.03	0.05	0.3	60.0	40	18	23	1.2
Gooseberries	0.7		9.9	44	-	0.01	0.02	0.3	30.0	22	9	28	1.6
Raspberries	0.8	-	9.0	41	-	0.02	0.05	0.6	25.0	40	22	37	1.6
Red currants	0.6	-	8.0	38	-	0.01	0.03	0.2	25	36	17	33	0.9
Black currants	1.0	-	8.0	40	-	0.02	0.02	0.3	200	36	35	33	1.3
Hips (dried fruits)	4.0	-	60.0	253	-	0.15	0.84	1.5	1200	66	20	20	28.0
Black tea bags	20.0	-	6.9	109	-	0.07	1.0	8.0	10.0	495	440	825	82.0
Black coffee	13.9	14.4	4.1	223	-	0.07	0.2	17.0	-	147	-	198	5.3
	15.0	3.6	7.0	119	-	-	1.0	24.0	-	100	-	250	6.1
Green peas	3.1	0.2	7.1	41	-	0.11	0.05	0.7	10	16	21	0.7	53
Tomato juice	1.0	-	3.3	18	-	0.01	0.03	0.3	10	13	26	0.7	32
Plum juice	0.3	-	16.1	65	-	0.02	0.04	0.6	6	-	-	-	-
Apple juice	0.5	-	11.7	47	-	0.01	0.01	0.1	2	8	5	0.2	9
Apple jam	0.4	-	65.3	247	-	0.01	0.02	-	0.5	14	7	1.8	9
Dried plum	2.3	-	65.6	264	-	0.1	0.2	1.5	3.0	80	102	15.0	83
Dried apples	3.2	-	68.0	273	-	0.02	0.04	0.9	2.0	111	60	-	77

Caloric value of different nutritious substances

Name of nutritious substances		Caloric value of 1 g nutritious substances during its oxidation in the organism
1	Proteins	4.1 Kcal
2	Fats	9.3 Kcal
3	Carbohydrates	4.1 Kcal

Share of nutritious substances in daily ration

Name of nutritious substances		Share
1	Proteins	11-13
2	Fats	25-30
3	Carbohydrates	56-61
Sum		100

Hygienic standard for milk

	Kind of milk	Acidity in %	Dry residue	Fatness
1	Whole	21	8.1	3.2
2	High fatness	20	7.8	6.0
3	Proteinized	25	10.5	2.5
4	Skim milk	21	8.1	-
5	Vitaminized, whole	21	8.1	3.2
6	Vitaminized, skim	21	8.1	-

The specification of quality of some grades of bread

Name of bread	Porosity (%),not less	Humidity (%) of crumb, not more	Acidity (^{0}), not more
Wheaten bread (higher grade)	**72-74**	**43-44**	**3**
Wheaten bread (first grade)	**67-70**	**44-45**	**3**
Rye bread	**48**	**51**	**12**

Table for recalculation of milk density

Reading of lactodensi-meter	Specific gravity of milk at 20^0 C										
	Temperature of milk										
	15	16	17	18	19	20	21	22	23	24	25
25.0	23.4	23.7	24.0	24.4	24.7	25.0	25.3	25.6	26.0	26.3	26.6
25.5	23.9	24.2	24.5	24.9	25.2	25.5	25.8	26.1	26.5	26.8	27.1
26.0	24.4	24.7	25.0	25.4	25.7	26.0	26.3	26.6	27.0	27.3	27.6
26.5	24.9	25.2	25.5	25.9	26.2	26.5	26.8	27.1	27.5	27.8	28.1
27.0	25.4	25.7	26.0	26.4	26.7	27.0	27.3	27.6	28.0	28.3	28.6
27.5	25.9	26.2	26.5	26.9	27.2	27.5	27.8	28.1	28.5	28.8	29.1
28.0	26.4	26.7	27.0	27.4	27.7	28.0	28.3	28.6	29.0	29.3	29.6
28.5	26.9	27.2	27.5	27.9	28.2	28.5	28.8	29.1	29.5	29.8	30.1
29.0	27.4	27.7	28.0	28.4	28.7	29.0	29.3	29.6	30.0	30.3	30.6
29.5	27.9	28.2	28.5	28.9	29.2	29.5	29.8	30.1	30.5	30.8	31.1
30.0	28.4	28.7	29.0	29.4	29.7	30.0	30.3	30.6	31.0	31.3	31.6
30.5	28.9	29.2	29.5	29.9	30.2	30.5	30.8	31.1	31.5	31.8	32.1
31.0	29.4	29.7	30.0	30.4	30.7	31.0	31.3	31.6	32.0	32.3	32.6
31.5	29.9	30.2	30.5	30.9	31.2	31.5	31.8	32.1	32.5	32.8	33.1
32.0	30.4	30.7	31.0	31.4	31.7	32.0	32.3	32.6	33.0	33.3	33.6
32.5	30.9	31.2	31.5	31.9	32.2	32.5	32.8	33.1	33.5	33.8	34.1
33.0	31.4	31.7	32.0	32.4	32.7	33.0	33.3	33.6	34.0	34.3	34.6
33.5	31.9	32.2	32.5	32.9	33.2	33.5	33.8	34.1	34.5	34.8	35.1
34.0	32.4	32.7	33.0	33.4	33.7	34.0	34.3	34.6	35.0	35.3	35.6
34.5	32.9	33.2	33.5	33.9	34.2	34.5	34.8	35.1	35.5	35.8	36.1
35.0	33.4	33.7	34.0	34.4	34.7	35.0	35.3	35.6	36.0	36.3	36.6
35.5	33.9	34.2	34.5	34.9	35.2	35.5	35.8	36.1	36.5	36.8	37.1
36.0	34.4	34.7	35.0	35.4	35.7	36.0	36.3	36.6	37.0	37.3	37.6

Zavialov's table for determination of bread porosity

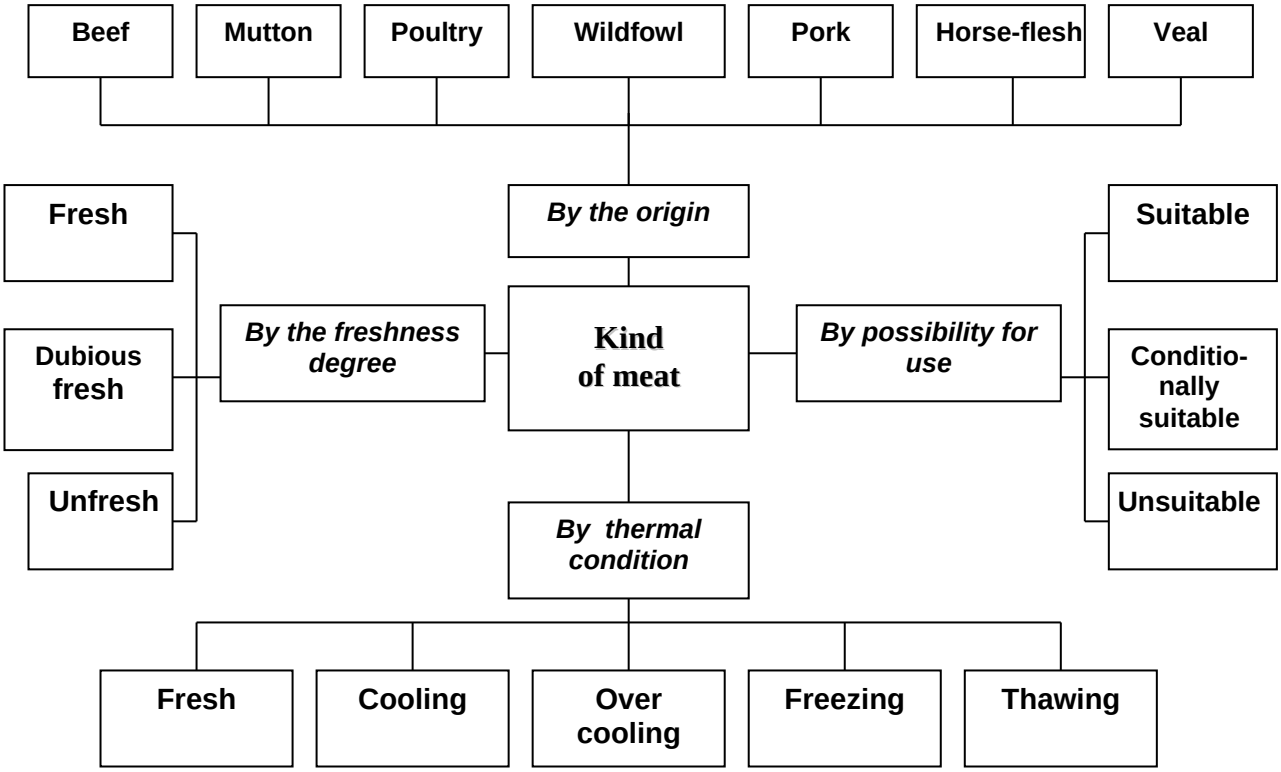
Rye bread		Wheaten bread	
Weight of 4 cylinders of bread (27 cm^3 each)	Porosity, %	Weight of 3 cylinders of bread (27 cm^3 each)	Porosity, %
4.9-83.6	35	51.0-50.1	50
83.5-82.3	36	50.0-49.1	51
82.2-81.0	37	49.0-48.1	52
81.0-79.8	38	48.0-47.1	53
79.7-78.5	39	47.0-46.1	54
78.4-77.2	40	46.0-45.1	55
77.1-75.9	41	45.0-44.1	56
75.8-74.6	42	44.0-43.1	57
74.5-73.3	43	43.0-42.1	58
73.2-72.0	44	42.0-41.1	59
71.9-70.7	45	41.0-40.4	60
70.6-69.4	46	39.3-39.0	61
69.3-68.1	47	38.8-38.0	62
68.0-66.8	48	37.9-36.8	63
66.7-65.5	49	36.7-35.8	64
65.4-64.2	50	37.5-34.9	65
64.1-62.9	51	34.8-33.9	66
62.8-61.6	52	33.8-32.9	67
61.5-60.5	53	32.8-31.9	68
60.4-59.2	54	31.8-30.9	69
59.1-57.9	55	30.8-29.9	70
57.8-56.6	56	29.8-28.9	71
56.5-55.3	57	28.8-27.9	72
55.2-54.0	58	27.8-26.9	73
53.9-52.7	59	26.8-25.8	74

Zavialov's formula : $P = 100 - 3.086 \cdot d$,
where P is required porosity; d is weight of one cylinder (27 cm^3) of bread

Contents of essential amino acids in the meat of different animals

Amino acids	Contents of amino acids (% to proteins)		
	Beef	Pork	Mutton
Leucine	7.6	7.2	8.1
Isoleucine	5.7	5.7	5.4
Valine	5.3	5.5	5.4
Lysine	8.9	8.7	8.8
Methionine	2.5	2.4	2.4
Tryptophan	1.4	1.4	1.4
Phenylalanine	4.2	4.2	4.3
Threonine	4.5	4.5	4.8
Arginine	6.4	6.4	6.2
Histidine	3.9	3.8	3.2

Classification of meat



The main causes of food toxicoinfections

Sources of infectioning of food products	Disturbances of technological processes in food cooking	Disturbances of sanitary and hygienic conditions of storing and realization of food products
1. Sick animals. 2. Polluted water. 3. Polluted utensils. 4. Polluted equipment. 5. Polluted apparatus. 6. Polluted transport. 7. Polluted rooms of food department. 8. Infected food products. 9. Carriers of bacilli: men, cats, dogs, poultry. 10. Carriers of microbes: flies, etc. 12. Breaking the rules of personal hygiene.	1. Insufficient thermal treatment of food products (meat, fish, and so on). 2. Insufficient sterilization of tinned food. 3. Insufficient pasteurization. 4. A small quantity of preservatives (antiseptics, sugar, vinegar, salt and others).	1. Delay in realization of ready food storing. 2. Storage of ready food under high temperature conditions. 3. Storage of boiled food in a thick layers. 4. Storage of ready food under in-sanitary conditions.

Organoleptic performance of meat and subproducts

Organoleptic parameters	Degrees of freshness		
	Fresh	Doubtful freshness	Stale
Outward appearance and color of a surface carcass	Crust without withers, of acyanotic-red color or light pink, refrozen carcass - red color, fat of a pulp particularly painted in bright red color.	Placely humidified, slightly sticky, darkened	Strongly dried up, coated by gray-brown slime or mould
State of muscles on a section	Slightly wet, do not abandon a wet stain on a filter paper; color: a beef -from light-red up to dark red, pork - from light pink up to red, mutton - from red up to red - cherry, young mutton - pink	Wet, abandon a wet stain on a filter paper, slightly sticky, darkly-red color. For the refrozen meat from a cut surface the slightly cloudy meat juice runs down	Wet, abandon a wet stain on a filter paper, sticky, red -brown color. For the refrozen meat - from a cut surface the cloudy meat juice runs down
Consistence	On a section meat is hard and resilient, formed by pressing of a dactyl the fossa fast is aligned	On a section meat is less hard and less resilient, formed by pressing of a dactyl the fossa is aligned slowly (during 1 minute), fat is mild, of refrozen meat - chipping	On a section meat is flabby, formed by pressing of a dactyl fossa is not aligned, fat is mild, refrozen meat –chipping, with scarf of lard
Smell	Specific, inherent to each aspect of fresh meat	A little bit acescent or a little bit rotten	Acidic, rotten or a little bit decayed
State of fat	Beef has white, yellowish or dark yellow color, the consistence is firm, at a compression is chipping; pork has white or light pink color, mild, elastic; mutton has white color, dense consistence. Fat should not have any smell of salting or rancidity	The greyly-mat shade, sticks to dactyls, can have a mild smell of salting	The greyly-mat shade, at a compression failure is smeared; pork fat can be coated with a small amount of a mould. A smell of rancidity.
State of tendons	Tendons are resilient, dense; the surface of joints is sleek. Tendons of the refrozen meat are mild, chipping, of bright red color	Tendons have less dense, of mat-white color. Joints surfaces are slightly coated with slime	Tendons are softened, grayish color. Joints surfaces are coated with slime
Transparence and smell of a broth	Transparent, fragrant	Transparent or cloudy, with a smell, that does not correspond to fresh broth	Cloudy, with a great amount of floccules, with sharp unpleasant flavor

CLASSIFICATION OF DUST

By the origin

- Dust of soil
- Dust of heating systems
- Dust of volcano
- Dust of industrial enterprise
- Transport dust
- Space dust

By the size of the particles

- **Dust as such:** size of particles is from 100 to 10μ
- **Clouds:** size of particles is from 10 to 0.1μ
- **Smokes:** size of particles is less than 0.1 μ

By chemical composition

- organic nature
  - **Vegetable dust:** cotton, wood, paper, flour, linen, tobacco
  - **Animal dust:** woolen, horn, bone, dust of hair
  - **Artificial organic dust:** different paints, explosive
- inorganic nature
  - **Metal dust:** copper, iron, zinc, lead, manganese
  - **Mineral dust:** asbestos, graphite, quartz, sand
  - **Artificial inorganic dust:** soda, glass, cement, phosphorus
- mixed nature
  - Mixture of dust of different kinds and groups

By the character of effect

- **Pantotoxic action**
- **Stimulating (irritative) action**
- **Allergic action**
- **Infecting action**
- **Carcinogenic action**
- **Fibrogenic action**

Maximum permissible concentration of dust and chemical substances in air of working zone

No	Substances	MPC (mg/m^3)
1	Nitrogen monoxide	5.0
2	Ammonia	20.0
3	Benzene	300.0
4	Manganese	0.3
5	Carbon monoxide (CO)	20.0
6	Lead	0.01
7	Mercury	0.01
8	Chlorine	1.0
9	Sulfureous gas (SO_2)	10.0
10	Dust, which includes SiO_2 from 10% till 70%	2.0
11	Dust, which includes SiO_2 more than 70%	1.0
12	Dust, which includes SiO_2 from 2% till 10%	4.0
13	Cement dust	2.0

Permissible concentration of harmful substances in atmospheric air of cities

Substances	Permissible concentration		Classes of danger
	max	average/day	
Nitrogen dioxide (NO_2)	0.085	0.04	II
Nitrogen monoxide (NO)	0.4	0.06	III
Sulphureous gas (SO_2)	0.5	0.05	III
Ammonia (NH_3)	0.2	0.04	IV
Benzene	5	1.5	IV
Carbon monoxide	5.0	3.0	IV
Ozone (O_3)	0.16	0.03	I
Dust with SiO_2 more than 70%	0.15	0.05	III
Dust with SiO_2 20-70%	0.3	0.1	III
Dust with SiO_2 less than 20%	0.5	0.15	III
Mercury	-	0.0003	I
Lead	0.001	0.0003	I
Chlorine	0.1	0.03	II

Hygienic standards of microclimate parameters at the work area of the industrial premises

Season of year	Category of work	Temperature (°C)					Relative humidity		Velocity of air movement (m/s)	
		Optimal	Permissible				Optimal	Permissible		
			Max		Min		Inconstant working places	At the constant and inconstant working places (not more)	Optimal, not more	Permissible at the working places
			At the work places							
			Constant working places	Inconstant working places	Constant working places	Inconstant working places				
Cold period of year	Easy I a	22-24	25	26	21	18	40-60	75	0.1	not more 0.1
	Easy I b	21-23	24	25	20	17	40-60	75	0.1	not more 0.2
	Middle II a	18-20	23	24	17	15	40-60	75	0.2	not more 0.3
	Middle II b	17-19	21	23	15	13	40-60	75	0.2	not more 0.4
	Heavy III	16-18	19	20	13	12	40-60	75	0.3	not more 0.5
Warm period of year	Easy I a	23-25	28	30	22	20	40-60	55 (t =28°)	0.1	0.1-0.2
	Easy I b	22-24	28	30	21	19	40-60	60 (t = 27°)	0.2	0.1-0.3
	Middle II a	21-23	27	29	18	17	40-60	65 (t = 26°)	0.3	0.2-0.4
	Middle II b	20-22	27	29	16	15	40-60	70 (t = 25°)	0.3	0.2-0.5
	Heavy III	18-20	26	28	15	13	40-60	75 (t = 24° and less)	0.4	0.2-0.6

Areas of school rooms

Name of the room	Minimal area (m^2)	
	total	Per pupil
Class-rooms	**50**	**1.25**
Educational studies	**50-66**	**1.25-1.65**
Laboratory	**66**	**1.65**
Workshop for boys	**66+16**	**3.3**
Study of work for girls	**50**	**2.5**
Doctor's consulting room	**12-15**	**-**
Gymnasium	**144-288**	**3.6-7.2**
Premises for pupil rest	**164-1176**	**0.42-0.46**
Hall with cloak-room	**98-490**	**0.25**
Toilet with washing room for pupil	**39-196**	**0.1**
Toilet for teachers	**4-6**	**-**
Room for dinner (for 80-490 places)	**52-319**	**0.65**
Kitchen (all rooms)	**94-171**	**-**
Library	**32-80**	**0.05-0.08**
Assembly hall (80-400 places)	**66-240**	**0.6**
Cabinet of head	**15**	**-**
Cabinet of deputy head	**8**	**-**
Office	**8-15**	**-**
Cabinet for teachers	**24-70**	**2-2.5 per for 1**

Hygienic norms of natural and artificial lighting (illumination) in school premises

Premises	Natural lighting, not less than		Artificial lighting (luxes) not less than	
	Daylight factor, %	Light coefficient	Incandescent lamps	Luminescent lamps
Class-rooms, studies, laboratories, work-shops, room for laboratory assistants, library	1,5	1:4 – 1:6	150	300
Study for drawing	2	1:3 – 1:5	300	500
Gymnasium, doctor’s consulting room, headmaster’s study, food department, assembly room	1	1:4 – 1:6	100	200
Economic rooms	0,5	1:7 – 1:8	30	50
Cloak-room	0,5	1:6 – 1:8	75	150

Amount of classes for different forms

Forms	Numbers of classes
1-3	4
4	4-5
5-8	5-6
9-11	6

Air temperature in the school rooms

Name of the room	Temperature ^{o}C
Class-rooms, laboratories, history room, literature room	18-20
Workshop	15-17
Hall for music class and for dancing lesson	18-20
Display room	18-22
Gymnasium	15-17
Cloak-room for gymnasiums	19-23
Doctor's consulting room	21-23
Places for pupils' rest	16-18
Library	17-21
Hall and clock-room	16-19

Limited duration of a working week at school (in hours)

Forms	Six-day week	Five-day week
1	**22**	**20**
2-4	**25**	**22**
5	**31**	**28**
6	**32**	**29**
7	**34**	**31**
8-9	**35**	**32**
10-11	**36**	**33**

The home work preparation time

Forms	The home work preparation time
1st	45-60 min
2nd	1.5 hour
3-4th	not more than 2 hours
5-6 th	not more than 2.5 hours
7-8 th	not more than 3 hours
9-11 th	not more than 4 hours

Duration of use of technical means in teaching process

Forms	Duration of use of technical means (in min)		
	Diafilm	Film	TV
1-2	**7-15**	**15-20**	**15**
3-4	**15-20**	**15-20**	**20**
5-7	**20-25**	**20-25**	**20-25**
8-11	**-**	**25-30**	**25-30**

Regional standard of pupils' physical development

Sign	Age	Number of measure-ments	M±m	±σ	Number of measure-ments	M±m	±σ
		Boys			Girls		
Stature, cm	7	170	125,0±0,39	5,18	137	124,1±0,42	4,92
	8	601	128,5±0,23	5,96	658	127,8±0,23	5,92
	9	797	133,7±0,22	6,17	774	132,9±0,22	6,12
	10	1028	138,5±0,20	6,39	845	138,2±0,23	6,87
	11	847	144,5±0,24	7,01	817	143,9±0,26	7,54
	12	815	148,2±0,25	7,24	842	150,0±0,26	7,53
	13	994	153,7±0,26	8,19	945	155,2±0,23	7,04
	14	918	160,7±0,29	8,86	908	159,1±0,21	6,18
	15	780	165,4±0,33	8,72	835	160,7±0,20	5,66
	16	497	170,4±0,38	8,41	635	161,9±0,23	5,92
	17	263	172,8±0,51	8,20	431	162,3±0,30	6,17
Weight, kg	7	170	25,6±0,31	3,99	137	25,5±0,36	4,20
	8	601	27,7±0,19	4,77	658	26,9±0,19	4,97
	9	797	30,5+0,19	5,06	774	29,7±0,20	5,65
	10	1028	33,7±0,20	6,32	845	33,3±0,22	6,57
	11	847	36,4±0,24	7,01	817	37,4±0,27	7,72
	12	815	40,2±0,27	7,70	842	41,6±0,29	8,38
	13	994	44,3±0,26	8,36	945	46,3±0,29	9,00
	14	918	50,1±0,31	9,26	908	50,6±0,29	8,72
	15	780	55,3±0,35	9,47	835	54,0±0,28	7,98
	16	497	60,1±0,56	9,74	635	55,7±0,34	8,54
	17	263	61,9±0,44	9,10	431	57,3±0,39	8,22
Circum-ference of the thorax, cm	7	170	62,5±0,29	3,80	137	60,6±0,40	4,72
	8	601	63,9±0,18	4,44	658	62,0±0,16	4,12
	9	797	64,5±0,17	4,68	774	63,3±0,18	5,02
	10	1028	66,9±0,16	5,26	845	66,1±0,19	5,47
	11	847	68,6±0,19	5,46	817	68,6±0,22	6,22
	12	815	71,4±0,20	5,76	842	71,8±0,21	5,96
	13	995	74,5±0,17	5,43	945	74,9±0,21	6,54
	14	918	78,3±0,20	6,20	908	78,1±0,21	6,20
	15	780	81,4±0,24	6,70	835	80,4±0,18	5,29
	16	497	84,7±0,32	7,00	635	80,8±0,24	6,10
	17	263	85,0±0,42	6,74	431	84,4±0,28	5,74

Regression scale by the stature

	Seven – years - old boys			Seven - years – old girls		
	Stature in cm	Weight in kg	Circumference of thorax in	Stature in cm	Weight in kg	Circumference of thorax in
Low	107	16.6	56.4	107	15.5	53.2
	108	17.2	56.8	108	16.0	53.6
	109	17.7	57.1	109	16.5	54.0
	110	18.2	57.4	-	-	-
Under	111	17.7	57.7	110	17.0	54.3
	112	19.2	58.0	111	17.6	54.7
	113	19.8	58.3	112	18.1	55.1
	114	20.3	58.6	113	18.6	55.5
	115	20.8	58.9	114	19.2	55.9
	116	21.3	59.2	115	19.7	56.2
Average	117	21.8	59.5	116	20.2	56.6
	118	22.4	59.8	117	20.8	57.0
	119	22.9	60.2	118	21.3	57.4
	120	23.4	60.5	119	21.8	57.8
	121	23.9	60.8	120	22.4	58.1
	122	24.4	61.1	121	22.9	58.5
	123	25.0	61.4	122	23.4	58.9
	124	25.5	61.7	123	23.9	59.3
	125	26.0	62.0	124	24.5	59.7
	126	26.5	62.3	125	25.0	60.0
	127	27.0	62.6	126	25.5	60.4
Above	-	-	-	127	26.1	60.8
	128	27.6	62.9	128	26.6	61.2
	129	28.1	63.3	129	27.1	61.6
	130	28.6	63.6	130	27.6	61.9
	131	29.1	63.9	131	28.2	62.3
	132	29.6	64.2	132	28.7	62.7
High index	133	30.2	64.5	133	29.2	63.1
	134	30.7	64.8	134	29.8	63.5
	135	31.2	65.1	135	30.3	63.8
	136	31.7	65.4	136	30.8	64.2
	137	32.2	65.7	137	31.4	64.6
	138	32.8	66.0	-	-	-
	139	33.3	66.4	-	-	-
$M \pm \sigma_R$	121.6 ±5.28	24.3 ±2.28	61.0±3.31	121.5 ±5.54	23.3 ±2.19	58.7 ±2.81

Notes

Notes

UDC: 613:577.4 (07)
Hygiene and Ecology. Module 1:
Workbook for students of medical faculty.
V.A. Korobchanskiy, O.I.Gerasimenko
Kharkov: KNMU, 2012. 120 pages

Structure and content of this workbook for students corresponds to the educational program and basic program plan of practical lessons for students of the 3rd year of study. It includes the list of compulsory practical skills and practical lessons for general problems of hygiene.

The workbook contains the main information and reference materials in accordance with the international and Ukrainian hygienic standards and other specific information.

Approved by scientific council of KNMU
Protocol № 6 from 21.05.2009.