

HYGIENE OF CHILDREN AND TEENAGERS

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SUBJECT AND MAIN TASKS OF HCT

HCT is a section of hygiene studying the action of environmental factors on a growing organism and developing preventive measures to maintain and strengthen the health of children and teenagers.

The primary tasks of HCT are:

- studying the physical development
- elaboration of hygienic requirements to children's preschool and school institutions, to training, physical training of children, to children's toys
- hygiene of teenagers work
- hygiene of children's nutrition
- medical-professional consulting at school

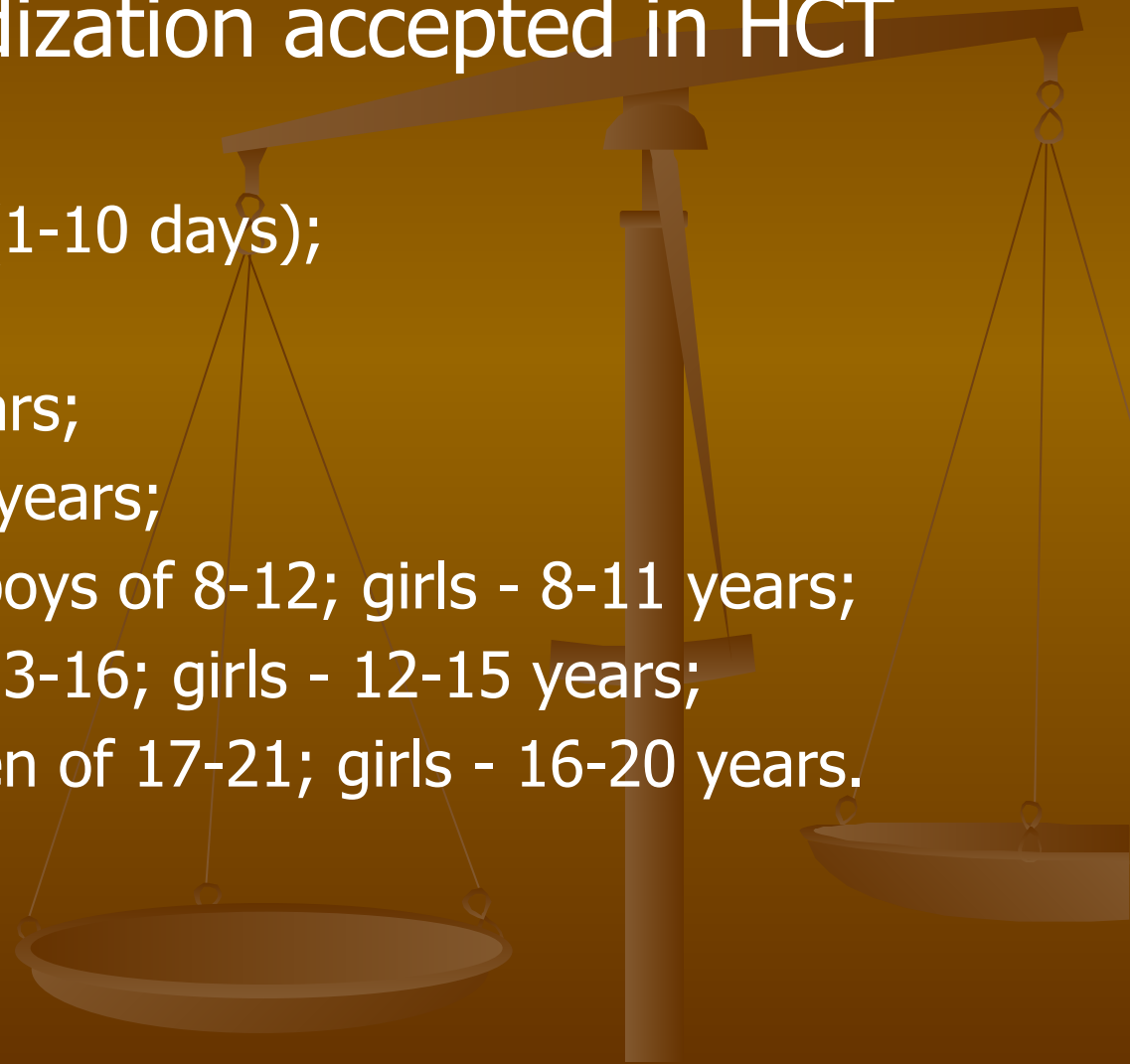
METHODS OF RESEARCH IN HCT

- Epidemiological method (studying the health state of children's contingents depending on environmental factors);
- Method of sanitary description (sanitary inspection of children's preschool institutions, schools, etc.);
- Method of sanitary examination (examination of children's toys, etc.);
- Methods of laboratory experiments (for example, studying the effect of harmful factors on a growing organism in experiments on laboratory animals).

SCHEMES OF AGE PERIODIZATION

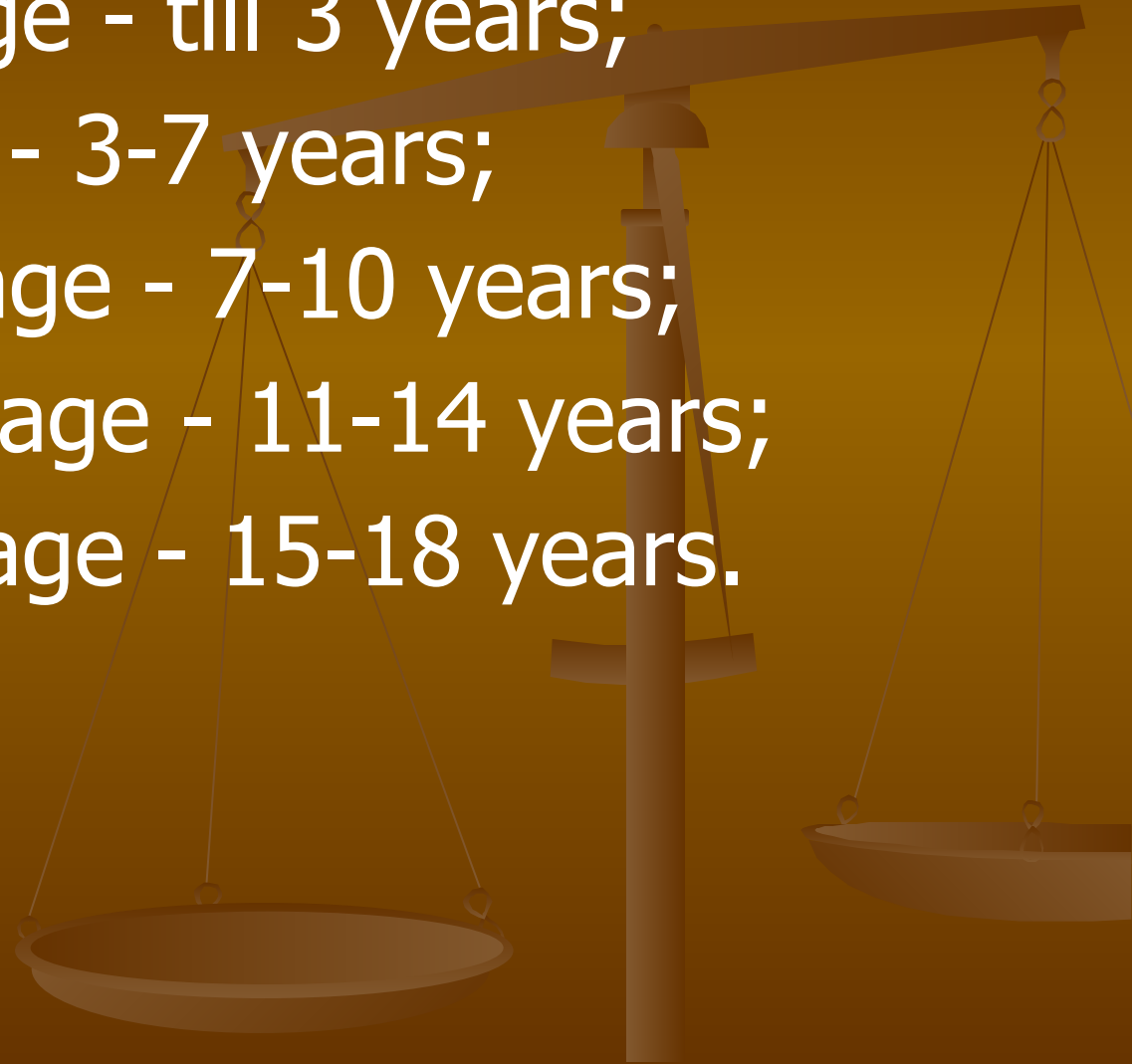
The biological periodization accepted in HCT includes:

- the period of new-born (1-10 days);
- infancy - till 1 year;
- early childhood - 1-3 years;
- the first childhood - 4-7 years;
- the second childhood - boys of 8-12; girls - 8-11 years;
- teenager age - boys of 13-16; girls - 12-15 years;
- youthful age - young men of 17-21; girls - 16-20 years.



The social age periodization

- day nursery age - till 3 years;
- preschool age - 3-7 years;
- junior school age - 7-10 years;
- middle school age - 11-14 years;
- senior school age - 15-18 years.



LAWS OF GROWTH AND DEVELOPMENT OF CHILDREN

- Irregularity of growth and development of organism depending on age – the younger the organism is, the more intensive these processes are;
- Irregularity of growth and development of different organs and systems at different age;
- Connection of growth and development with sex - unequal rates of growth and development in boys and girls;
- Influence of genetic factors, environmental factors and social conditions, morbidity on growth and development;
- Influence of acceleration.

Physical development is a complex of morphological and functional signs determining growth, formation of child's organism, resources of its vital energy, tolerance and activity, and level of biological development also.

Physical development is one of the important parameters characterizing the health state of children and influence of various factors on it.

The purposes of physical development research are the following:

- revealing the laws of growth and development;
- estimation of individual and population level of health;
- studying the effect of environmental, social, genetic factors;
- estimation of efficiency of medical-prophylactic measures.

THE RESEARCH METHODS OF PHYSICAL DEVELOPMENT

- Somatoscopic – the description of the skeleton form, spinal column, chest, legs, posture, development of muscles, puberty, elasticity of the skin
- Somatometric (anthropometric) – measuring height, body mass and circumference of the chest
- Physiometric – measuring vital capacity of the lungs, chest excursion, muscle strength, blood pressure

METHODS OF PHYSICAL DEVELOPMENT ESTIMATION

- Method of sigma (σ) deviations

Age	M for height	σ of height	M for weight	σ of weight	M for circum. of the chest	σ of circum. of the chest
7	124	7	15	6	59	4
8	128	7	25	4	62	4
9	134	6	29	5	65	4
10	137	7	31	5	65	5
11	142	7	35	6	69	5
12	148	8	39	7	72	6
13	155	8	44	7	75	6
14	162	9	49	8	78	6
15	172	7	54	8	81	6
16	174	8	57	8	82	6
17	175	6	62	8	86	6

If result is within $\pm 1\sigma$, sign corresponds to age. If result is from $\pm 1,1 \sigma$ to $\pm 2 \sigma$, this sign above/below age norm, if result is within $\pm 2 \sigma$ and more – high/low sign.

- **The diagram (profile) of physical development.** The diagram graphically represents the data received according to each parameter, if all quotients by 3 parameters are within the limits of 1σ the development is proportional (harmonious), up to 2σ – disharmonious, more than 2σ – sharply disharmonious.
- **Method of centile lines (centiles).** It is mostly used in pediatrics. For research not less than 100 children are necessary ranged according to increase of each parameter (height, weight, chest circumference), thus the first child is 1st centile, the last one – 100^s centile. Special tables make up on basis of these data. If individual indexes of child are within 25-75 centiles, his development corresponds to age. If child's indexes more than 75 centile – development is above average, if less 25 centile – development is below average.
- **Method of regression scales.** It is used for estimation of development harmony (by special tables or diagram). Method shows on the basis of statistical researches what body mass and chest circumference should correspond to the given height. Variants of estimation: development is harmonious within the limits of $+1\sigma$ up to -1σ ; from $\pm 1,1\sigma$ up to $\pm 2\sigma$ – disharmonious, more or less than $\pm 2\sigma$ – sharply disharmonious.

DETERMINATION OF BIOLOGICAL DEVELOPMENT LEVEL (biological age)

Biological age – is complex of morphological and functional characteristics of organism, depending from individual rate of growth and development. Biological age is determined by criteria /due to tables of sigma deviations/:

- number of second teeth
- degree of hand ossification
- growth and augmentation of growth for last year
- time of cutting and change of first teeth
- development of secondary sexual characters

ESTIMATION OF HEALTH STATE

The criteria for estimation of health state are:

- 1) Presence or absence of chronic diseases – determined at medical examination by specialists.
- 2) Degree of resistibility of child's organism estimated by liability to diseases – number of acute diseases (including acute attacks of chronic) during last year.
- 3) Functional level of the main organism systems.
- 4) Level and harmony of physical development.
- 5) Level of mental development – determined by psychoneurologist.

Acceleration as an Actual Problem of HCT

Acceleration is a speeded up physical development of children and teenagers as compared with anthropometric parameters of children many years ago. For the recent 10-15 years rates of acceleration have noticeably decreased and even deceleration is observed, *i.e.* decreasing of physical development of children and teenagers in comparison with anthropometric parameters of children 10-15 years ago.

Theories (Reasons) of Acceleration

Up to now the universal reason of acceleration is not established in view of great amount of factors influencing physical development.

The basic theories of acceleration are:

- ❑ **Alimentary** theory – improvement of qualitative and quantitative parameters of nutrition of the population;
- ❑ **Medical** theory – decrease of disease incidence, gynaecological pathology due to development of medicine;
- ❑ **Heliogenic** theory - influence of cyclic changes of solar activity and levels of UVR;
- ❑ **Ecological** theory - growth of CO₂ content in atmosphere, increase of intensity of electromagnetic fields, elevation of level of natural radioactive background;
- ❑ **Theory of heteresis** – increase of mixed marriages of different races and nationalities.

Medical and Social Consequences of Acceleration

Medical unfavourable effects:

- rejuvenation of many diseases (oncological, cardiovascular, etc.);
- functional disorders of organ and system development;
- the problem of a large fetus in obstetrics due to intrauterine acceleration;
- the necessity of revision of hygienic norms (norms of nutrition, size of school furniture, standards of physical development);
- gynaecological pathology due to early pregnancy and abortions.

Social consequences are caused by delay of mental development as compared with physical one: increase in teenage crime, growth of divorce number and number of children without care of parents, etc.

Hygienic requirements to children's preschool institutions and schools



Hygienic requirements to children's preschool institutions (CPI)

Types of CPI are: kindergarten (for children of 3-7 years), day nursery (till 3 years), children's center (day nursery + kindergarten), children's home, preschool children's home, specialized CPI for children with disorders of development, preschool health-improving institutions for summer vacation.

Requirements to Choice of Site for CPI

- Accessibility for population - radius of service in microdistrict is 300 m;
- Optimal hygienic conditions on the site (optimal microclimate, absence of air pollution by chemical and physical factors, presence of green plantations).
- The site area is 30-40 m² per child;
- The form of the site should be rectangular;
- There should be special functional zones on the site based on principle of group and age isolation.

Functional zones of CPI site

- **Zone of building up**
- **Zone of group playgrounds.** The area of group playgrounds should be 7,2 m² per child, game and sports equipment should correspond to age.;
- **Zone of sports grounds.** There should be 2 sport grounds with area of 150-250 m² – separately for junior and senior age groups;
- **Household zone.** It should be located in a distant part of the site, it should be separated by green plantations;
- **Zone of green plantations.** It should occupy not less than 50% of the site area;

Hygienic requirements to a group section

A group section is the basic functional unit of CPI; it is a set of premises intended for staying one group of children.

- A group room is a common room which can be divided into a room for playing and a bedroom. The total area is 4 m^2 per child.
- Frequency of natural ventilation - 1,5.

Hygienic requirements to illumination.

- Coefficient of natural illumination (CNI) - 1,5%.
- Light coefficient (LC) 1:4 – 1:5.
- Artificial light 150 lx (at luminescent lamps 300 lx).

Microclimate in CPI:

- The air temperature is $21-22^\circ \text{C}$ (in a day nursery) or $18-20^\circ \text{C}$ (in a kindergarten), relative humidity - 40-60%, speed of air movement - 0,1-0,3 m/sec.

Determination of age of starting training at school

Medical criteria:

- Level of biological development
- Health state in time of examination
- Acute diseases during last year

Psychophysiological criteria - characterizing development of school necessary functions

Medical indications to postponement of children's enter to school

A. Diseases during last year:

- Infectious hepatitis
- pyelonephritis, diffuse glomerulonephritis
- myocarditis nonrheumatic
- rheumatism (active phase)
- acute, repeated, prolonged respiratory diseases
- tuberculosis
- blood diseases
- Severe forms of children's infectious diseases

B. Chronic diseases and states

- delay of mental development
- delay of physical development (height less M-2 σ of regional standards, absence of secondary teeth)
- neuroses and neuroseliked disorders (enuresis, logoneurosis)
- endocrine diseases (endemic goiter, diabetes mellitus etc.)
- myopia more 2,0 D with tendency to progress
- chronic tonsillitis (decompensated form)
- vegetative-vascular dystonia
- heart diseases
- chronic bronchitis, bronchial asthma, chronic pneumonia at absence of stable remission during year
- gastric and duodenal ulcer, chronic gastritis, gastroduodenitis, cholecystitis of unstable remission stage, with frequent attacks
- anemia (at content of hemoglobin less 100 g/l)
- other chronic diseases of unstable remission stage and with frequent attacks.

Hygienic requirements to schools

Requirements to School Location

- **Accessibility** (radius of service is 1.5 km in a city and 3 km in the country);
- **Optimal hygienic conditions** in the place of future school site.

Requirements to a School Site

- **The area is 20-50 m² per pupil**, the site should be of a rectangular form.
- **Functional zones of school site include:** zone of building up (of school building); zone of rest; training-experiential zone; sports zone; household zone; zone of green plantations.

Functional zones of school site

- **Zone of building up.** The systems of school construction may be:
centralized (all premises are in one building; it is an old project which causes high level of infections, noise, air pollution),
a pavilion type (there are many small buildings, it is accepted now for schools of a sanatorium type),
a block type (blocks for junior, middle, senior classes, for gymnasium, kitchen).
- **Zone of rest** - two grounds for outdoor games for junior and senior classes, a ground for a quiet rest, benches.
- **Training-experiential zone** – a garden, vegetable garden, greenhouses, educational workshops, etc.
- **Sports zone** – a stadium with racetracks and pits for jumps, grounds for volleyball, sports apparatuses, etc.
- **Household zone** should be located at the end of a school site, closer to economic entrance and separated by green plantations.
- **Zone of green plantations** should occupy not less than 40-50 % of the site area

Hygienic Requirements to a School Classroom

- The area should be 1.25 m² per pupil, on the whole not less than 50 m².
- Microclimate should be the same as for usual premises, frequency of air ventilation per hour - 4, ventilation volume - 20-30 m³/h/pupil, CO₂ concentration in the air is not more than 0.1 %.
- Requirements to illumination are very important. It should be:
 - natural: LC 1/4-1/5, CNI – 1.5 %, light angle - 27°, angle of aperture – 5°;
 - artificial: common illumination - 150 lux (luminescent lamps - 300 lux).
- Requirements to school desks (school tables): In a classroom the desks should be of not less than 3 sizes, placed in 3 rows, with distance of 0.7 m between rows, 2.5m to the blackboard, and 0.5m to the walls.
- *Hygienic Requirements to Educational Laboratories*
Chemistry, physics, biology laboratories. Their area should be 70-100 m², they should have an additional room of 6 m²; it is better to locate them on the top floors of a school building where airing is better; they should be equipped with artificial ventilation, water-pipe for washing utensils and equipment.

Common Hygienic Requirements to School Furniture

Hygienic Requirements to School Furniture include the following:

- correspondence to the anthropometrical sizes of children (prevention of disorders of the osteomuscular system and organs of vision);
- prevention of traumatism;
- non-toxicity of materials and dyes, their stability to disinfection;
- light or green colouring of tables.

Sizes of School Desks

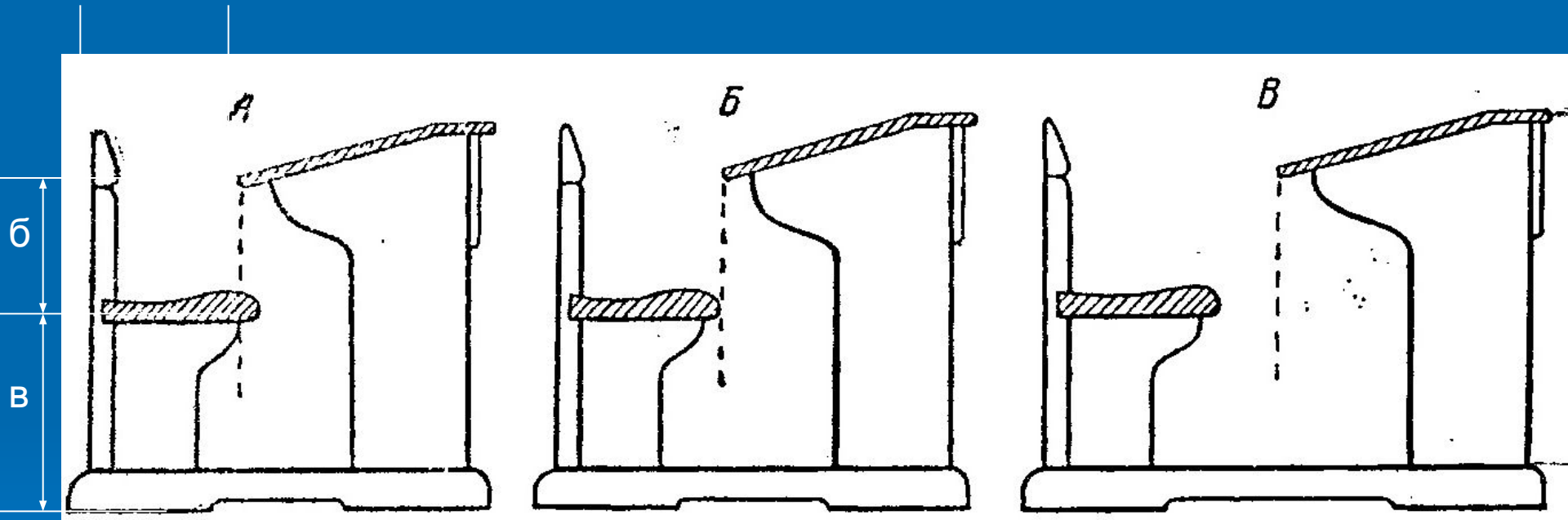
- In each classroom there should be desks of not less than 3 sizes, at schools the desks of 6-12 sizes are used having multi-coloured marking for a teacher. At the beginning of classes the teacher should distribute the pupils according to their size (by Flerov's ruler or by Listov's formula: № of school desk = 2 first figures of height - 5).

Hygienic Standards of School Furniture

These include:

- **Differentiation** – a vertical distance from a table to chair – it should be equal to $1/7-1/8$ of height or to the distance from the lowered elbow to sitting.
- **Distance of sitting** – a horizontal distance between the edge of the table and edge of sitting – it should be 4–5 cm.
- **Distance of chair back** – a horizontal distance from the edge of table up to back of sitting = the anterior-posterior section of body + 3-5 cm.
- **Height of sitting** - length of leg + 2 cm.

SIZES OF SCHOOL DESK



а – дистанция спинки

б – дифференция

в – высота сидения

А – отрицательная дистанция сидения, **Б** – нулевая дистанция сидения, **В** – положительная дистанция сидения

Hygienic Requirements to School Schedule

Restriction of number of lessons per week: in the 1st form - up to 20 lessons, 2nd form - up to 22, 3-4 form - 24, 5-8 form - 30, 9-11 form - 31 lessons per week;

Arrangement of lessons by complexity within a day and week using a scale of difficulty of school subjects: the exact sciences - 11 points, singing - 1 point.

Requirements: it is impossible to put 2 difficult lessons together, at the beginning and at the end of the day and week. The maximally difficult lessons must be on Tuesday and Wednesday, i.e. in the middle of the week. It corresponds to dynamics of capacity for work.

Medical-professional consultation and orientation at school

Medical-professional consultation and orientation at school are carried out by doctors, teachers and experts of youth employment centers with the purpose of choosing the future professions and recommendation to schoolchildren in respect to professions suitable for their health state.

- Professional orientation includes: information service about availability of vacant occupations, psychological consultations in view of type of the nervous system activity.
- **Medical-professional consultation** is carried out twice:
 - in the 5th form for children with abnormalities of physical development, for the rest - in the 7th form;
 - in the 10-11th form.
 - For the first time it is carried out for early revealing and treatment of diseases limiting capacity for work, for the second time – for the final determination of range of professions.
- While medical professional consultations the medical documentation for a schoolboy is used, evaluation of physical development and physical examination are carried out, if necessary – a thorough medical examination in hospital is done.

Medical-professional consultation and orientation at school

From the medical point of view all professions are divided into 4 groups:

- professions not connected with difficult working conditions;
- professions connected with action of harmful factors;
- professions connected with constant effect of harmful factor complex;
- professions connected with difficult and harmful working conditions.