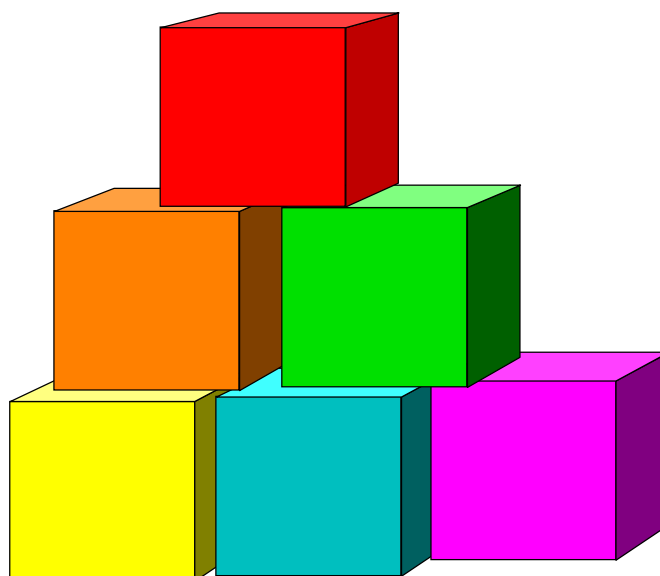


Н.К. ИВАНОВА

**ОБУЧЕНИЕ ЧТЕНИЮ
НАУЧНО-ТЕХНИЧЕСКОЙ
ЛИТЕРАТУРЫ**



Министерство образования Российской Федерации
Ивановский государственный химико-технологический
университет

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Учебное пособие
для студентов I курса
технических специальностей
(английский язык)

Иваново

2002

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Учебное пособие «Обучение чтению научно-технической литературы» предназначено для аудиторных занятий со студентами технических специальностей (группы механического факультета, технического колледжа и др.), изучающими язык специальности. Цель пособия – подготовить студентов к работе с оригинальной литературой, обучить необходимым лексико-грамматическим навыкам для извлечения информации из профессионально-ориентированных текстов.

Тексты каждого урока (А, В, С) позволяют осуществлять работу по обучению различным видам чтения, закрепить полученные навыки работы с иноязычным текстом, а диалоги и творческие задания – усвоить определенный набор речевых клише.

При составлении методических указаний использовалась следующая литература:

1. Гундризер В.Р. Учебник английского языка для технических вузов. М., 1972.
2. Зверева Н.В., Иванова Н.К. Методические указания по обучению чтению для студентов I курса механического факультета. Иваново, 1992.
3. Носова Н.Н., Пинзул Г.Е. Пособие по английскому языку для машиностроительных вузов. М., 1970.
4. Esteras S.R. Infotech. English for computer users. Cambridge, 1996.
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PART I

LESSON I

FUNDAMENTAL PHYSICAL CONCEPTS

С I. Прочитайте и переведите следующие интернациональные слова:

atom /'ætəm/, characteristic /,kærəktə'rɪstɪk/ chemist /'kemɪst/,
electron /ɪ'lektɹən/, element /'elɪmənt/, form /fɔ:m/, gas /gæs/, gaseous
/geɪzjəs/, mass /mæs/, philosophy /fɪ'lɒsəfɪ/, proton /'prəʊtɒn/, reality
/rɪ'ælɪtɪ/, physics / 'fɪzɪks /, crystal /'krɪstl/.

С II. Прочитайте и запомните следующие английские слова. Сравните их с русскими словами, имеющими тот же корень:

concept	/'kɒnsept/	понятие (ср. концепция)
contain	/kən'teɪn/	содержать (ср. контейнер)
container	/kən'teɪnə/	контейнер
identify	/aɪ'dentɪfaɪ/	устанавливать (ср. идентифицировать)
identification	/aɪ,dentɪfɪ'keɪʃən/	установление (ср. идентификация)
object	/'ɒbdʒɪkt/	предмет (ср. объект)
pack	/pæk/	упаковывать (ср. паковать)

С III. Прочитайте следующие слова и запомните их значения:

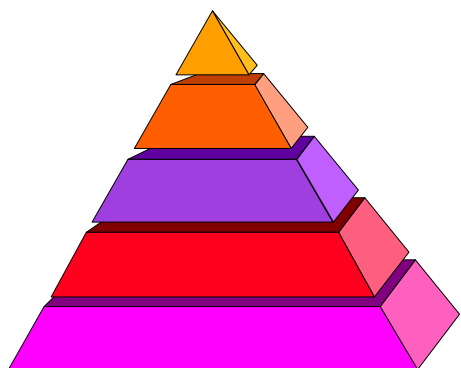
according to	согласно, по
air	воздух
amount	количество, величина; доходить до...
call	называть
change	изменять; изменение
common	обыкновенный, распространенный
compound	соединение
consist	состоять
convert	превращать
define	определять
definite	определенный

definition	определение
degree	степень, градус
example	пример
fill	наполнять
keep (kept, kept)	держатъ, сохранять
kind	род, сорт, вид
liquid	жидкость
matter	материя, вещество
possible	возможный
space	пространство
steam	пар; выпускать пар
substance	вещество
volume	объем; громкость
zero	нуль

К IV. *Переведите словосочетания на русский язык:*

1. common -- metals, compound, liquid ;
2. atmospheric , isothermal, thermodynamic -- changes ;
3. organic, meteoric -- matter ;
4. ideal, heavy -- liquid ;
5. water, vacuum, steam, vector, isotopic -- space ;
6. atomic, electronic, critical, isomeric, normal -- state ;
7. absolute, molecular, nominal -- volume;
8. condensed working atmospheric -- steam ;
9. according to -- the new theory, this definition ;
10. crystalline, radioactive -- substance ;
11. common -- metal, liquid, compound;
12. static, dynamic, temperature -- characteristic.

TEXT A. FORMS OF MATTER



1. **Chemists** have already identified over a million compounds. But only a little over a hundred elements are known to science.

2. Some of the substances are solids , such as iron (железо) or stone (камень). Others are liquids, such as oil

(нефть) or water. Others are gases, such as air or steam. Solid, liquid, gas and plasma are called **physical** states of matter. A solid object can keep a definite shape (форма) and a definite volume. A liquid also has a definite volume, because it is almost **impossible** to pack it into any smaller space. But a liquid will take on the shape of any **container** into which it is poured (наливать). A gas, on the other hand, has neither a definite shape nor a definite volume. If some air is let (впускать) into a container it will fill the whole space uniformly (равномерно).

One kind of matter may be in all three principal (главный) states. Water is a common example. **Usually** water is a liquid, but at low **temperatures** it goes into its solid state (called ice), and at a **higher** temperatures it becomes steam, which is the name for the **gaseous** state of water. We usually think of air as a gas, but at about 300 degrees below zero it turns into (превращаться) a **bluish** liquid. Iron, commonly seen in the solid state, becomes a liquid in a foundry (литейный цех) and is a gas in the sun and in the stars (звезды) where the temperature is many thousands of degrees. These are all physical changes, and the material keeps its identifying characteristics. (Текст составлен по кн.: Freeman I.M. Physics made simple. New York, 1965, p. 14).

К V. Переведите следующие словосочетания на английский язык:

1. твердое, газообразное, молекулярное -- состояние ;
2. воздушное, паровое, водяное -- пространство;
3. возможное, большое, определенное, -- изменение ;
4. малое, большое, одинаковое -- количество;
5. химическое , сложное -- соединение.

VI. Проанализируйте состав выделенных слов. Найдите в тексте другие примеры наречий, прилагательных в сравнительной степени.

Ж VII. Ответьте на вопросы:

1. How many compounds have chemists identified ?
2. How many elements are known to science ?
3. What are the four physical states of matter ?
4. Can a solid object keep a definite volume ?
5. Has gas a definite volume?
6. What states of water do you know ?
7. In what state is iron in the sun ?

8. What characterizes a physical change ?

К VIII. Переведите следующие предложения на английский язык:

1. Химики установили свыше 1 млн соединений.
2. Науке известно свыше 100 элементов.
3. Мы знаем четыре состояния материи: твердое тело, жидкость, газ и плазма.
4. Жидкость занимает определенный объем.
5. Но жидкость может принять форму любого сосуда.
6. Газ не имеет ни определенной формы, ни определенного объема.
7. Обычно вода является жидкостью, но при низких температурах она превращается в лед, а при более высоких температурах в пар.
8. Приблизительно при 300°C ниже нуля воздух превращается в голубоватую жидкость.
9. При очень высоких температурах железо может превратиться в газ.

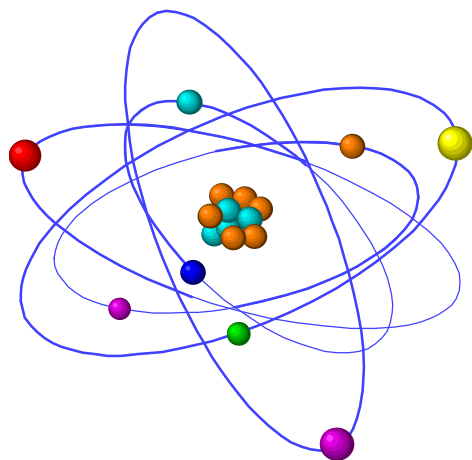
TEXT B.

JAMES CLERK MAXWELL (1831-1879)

J.C. Maxwell, the great physicist and mathematician, was born in Edinburgh, on November 13, 1831.

After school he entered the University of that city. Then he attended the University of Cambridge and graduated from it in 1854. When at the University Maxwell took great interest in mathematics and optics.

In 1856 he became Professor of natural philosophy and in 1860 Professor of physics and astronomy at King's College, London. In London he lived for 5 years.



In 1871 Maxwell became professor of experimental physics at Cambridge. He organized the laboratory for the study of magnetism and electricity which made Cambridge world known. This was a very fruitful period of Maxwell's life. He studied the problems of electromagnetism, molecular physics, optics, mechanics and others.

Maxwell wrote his first scientific work

when he was fifteen. Since that time he wrote a great number of works. His most outstanding investigations are in the field of the kinetic theory of gases and electricity. Maxwell is the founder of the electromagnetic field (side by side with Faraday) and the electromagnetic theory of light. In 1873 he published his famous work on electricity and magnetism.

Maxwell's work on the kinetic theory of gases, the theory of heat, dynamics and the mathematical theory of electricity and magnetism are monuments to his great genius.

- *Поставьте ключевые вопросы к тексту.*
- *Разделите текст на логические части и озаглавьте их.*
- *Перескажите и обсудите текст.*



TEXT C. APPLYING FOR A JOB

Avon Gars Ltd.

Birmingham, England

job _____

name _____

age _____

nationality _____

marital status Married

 Single

education Secondary School

 Technical School

 University

languages	French	<input type="checkbox"/>
	Spanish	<input type="checkbox"/>
	Russian	<input type="checkbox"/>
	Arabic	<input type="checkbox"/>

countries visited France, Germany, Russia (any other)

Dialogue № 1



Interviewer Come in ... come in.
It's Mr Chandler, isn't it?

Mr Chandler Yes, that's right. How do you do?

Interviewer How do you do?
Please take a seat.

Mr Chandler Thank you very much.

Interviewer Well, I've got your application
form here.

I just want to check the
information... Is that all right?

Mr Chandler Yes, of course.

Interviewer Now, you're 31, aren't you?

Mr Chandler Yes, I am.

Interviewer ... and you aren't married, are you?

Mr Chandler No, I'm not ... not yet.

Interviewer Uh, huh. You went to secondary school and technical
college, didn't you?

Mr Chandler Yes, I did.

Interviewer ... but you didn't go to university, did you?

Mr Chandler No, I didn't. I started work when I was 20.

Interviewer I see. You can speak French and Russian, can't you?

Mr Chandler Yes, I can ... but not fluently. I speak French better
than Russian.

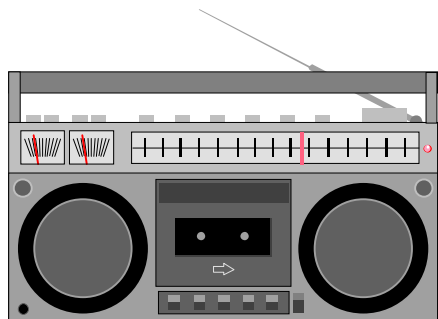
Interviewer ... but you can't speak Spanish, can you?

Mr Chandler No, no, I can't.

Interviewer You've been to France, haven't you?

Mr Chandler Yes, I have ... and to Germany and Russia.

Interviewer So I see ... but you haven't been to the Middle East,
have you?
Mr Chandler No, I'm afraid I haven't, but I'd like to.
Interviewer Good.



1. Прослушайте и проанализируйте диалог № 1.

2. Прослушайте диалог № 2, воспроизведите его.

LESSON II

С I. Прочитайте и переведите интернациональные слова:

electrical / ɪ'lektɹɪkəl/, electrically /ɪ'lektɹɪkəlɪ/, intense /ɪn'tens/
ion /'aɪən/, neutral /'nju:trəl/, normal /'nɔ:məl/, normally /'nɔ:məlɪ/
ultraviolet /,ʌltrə'vaɪələɪt/, plus /plʌs/.

С II. Прочитайте и запомните английские слова. Сравните их с русскими словами, имеющими тот же корень:

ionize	/'aɪənaɪz /	ионизировать
negative	/'negətɪv /	отрицательный (ср. негативный)
neutralize	/'nju:trəlaɪz/	нейтрализовать
positive	/'pɒzɪtɪv /	положительный (ср. позитивный)

С III. Прочитайте следующие слова и запомните их значения:

charge	заряд; заряжать
discharge	разряд
complete	завершать, замыкать
completely	полностью
contribute	делать вклад
contribution	вклад
divide by	делить на
heat	тепло; нагревать
hydrogen	водород

light	свет; светить; легкий
measure	измерять
measurement	измерение
nucleus	ядро
nuclei	ядра
property	свойство
rate	скорость, темп
ray	луч
x-rays	рентгеновские лучи
thus	таким образом
union	соединение, объединение

К IV. Переведите следующие словосочетания на русский язык:

1. electrical, electrostatic, negative, positive, zero -- charge;
2. corona, gas, electric, static, electron -- discharge;
3. the heat of -- condensation, crystallization, dissociation, neutralization, reaction, formation;
4. anode, alpha, heat, beta, radioactive, cathode, cosmic, gamma, delta -- rays;
5. molecular complex gaseous -- ion ;
6. dynamic, dielectric, photoelectric -- properties;
7. direct, indirect, absolute, nuclear, hydraulic, linear -- measurement;
8. the rate of -- acceleration, discharge, cooling (охлаждение), evaporation (испарение);
9. infrared, natural, polar -- light.

К V. Переведите следующие словосочетания на английский язык:

1. атомное, радиоактивное, сложное, черное -- ядро;
2. медленный, атомный, нормальный -- электрон;
3. красный , электрический, ультрафиолетовый -- свет;
4. физические, основные -- свойства;
5. легкий, тяжелый -- водород.

С VI. Прочитайте и переведите следующие пары слов. Определите значение префиксов:

a) charge - **dis**charge, connect - **dis**connect, colour (окрашивать) - **dis**colour, arrange (располагать) - **dis**arrange, appear (появляться) -

disappear, continue (продолжать) - **discontinue**, place (помещать) - **displace**.

b) ready - **unready**, charge - uncharged, connect - unconnected, stable - unstable; unused, undetected, unidentified, unmeasured, unreacting, unchangable.

c) ultraviolet, ultramicrometer, ultramicroscope, ultra - modern, ultra - liberal.

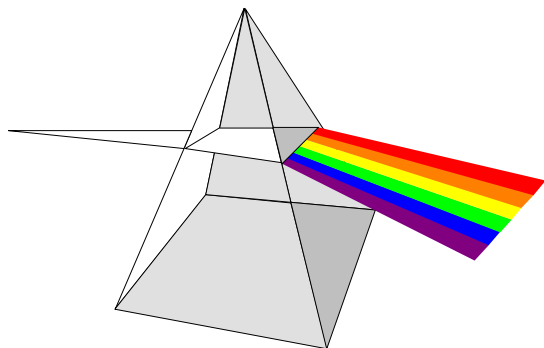
N VII. Подберите русские (А) и английские (Б) эквиваленты:

	А		Б
1. thus	1. свет	1. заряженный	1. charged
2. property	2. водород	2. замкнутый	2. heated
3. light	3. луч	3. нагретый	3. called
4. hydrogen	4. тепло	4. ионизированный	4. neutralized
5. ray	5. таким образом	5. названный	5. changed
6. negative	6. отрицательный	6. измененный	6. ionized
7. heat	7. свойство	7. нейтрализованный	7. completed

С VIII. Прочитайте и переведите текст. Запомните выделенные слова:

ТЕХТ А. THE PROPERTIES OF PLASMA

1. A common gas such as air or **hydrogen** is made up of molecules which are electrically **neutral**. A molecule may **consist of** only one atom or it may be the **union** of two or more atoms. Every hydrogen atom has a **nucleus** of one proton, normally **accompanied** (сопровождать) by one electron, whose **negative charge** neutralizes the **positive charge** of the nucleus. Thus a molecule of hydrogen has two **atomic nuclei** and two electrons.



2. But if the molecules of a gas are **subjected** (подвергать) to **ultraviolet light** or x-rays, to an **electrical discharge** or to **intense heat**, electrons are torn loose (отрываться) from molecules. The remnant (остаток) of a molecule is therefore positively

charged and is called an ion. We say the gas is ionized. The **ionized gas** is called "plasma".

3. A plasma may be **completely** ionized, in which state all the molecules are **divided** into ions and electrons, or it may be partially (частично) ionized, when only some part of the molecules is ionized and all the other molecules are **electrically neutral**, normal molecules. (Текст составлен по кн.: The encyclopedia of physics, p. 539, 682).

С IX. Прочитайте и переведите предложения, заполняя пропуски одним из приведенных ниже слов:

hydrogen, completely, called, properties, charged

1. The ... of plasma were discussed in this text.
2. The electron is negatively
3. The molecule of ... has two atomic nuclei and two electrons.
4. The ionized gas is ... plasma.
5. A plasma may be ... ionized or it may be partially ionized.

X. Составьте предложения:

- a) a union of, two, a molecule, be, may, more, or, atoms.
- b) atom, hydrogen, every, has, proton, one, a nucleus, of.
- c) the, of, nucleus, the negative, electron, charge, neutrolizes, charge, the positive, the

К XI. Переведите следующие предложения на английский язык.

1. Молекула может состоять из одного, двух или более атомов.
2. В каждом атоме водорода - один протон.
3. В молекуле водорода - два электрона.
4. Ионизированный газ называется плазмой.
5. Плазма может быть ионизирована полностью или частично.
6. Электрон заряжен отрицательно.
7. Протон заряжен положительно.

TEXT B.
MADE IN ENGLAND



Ken: I like your radio, is it new?
Pat: Yes, I bought it last week, it's a Bisonic.
Ken: Bisonic? I've never heard of it. Where was it made?
Pat: I'm not sure. I think it was made in Japan.
I'll have a look. No, I'm wrong. It was made in England.

Where was your watch made?

pen
shirt
dress
jacket

Where were your shoes made?

socks
jeans
glasses
trousers

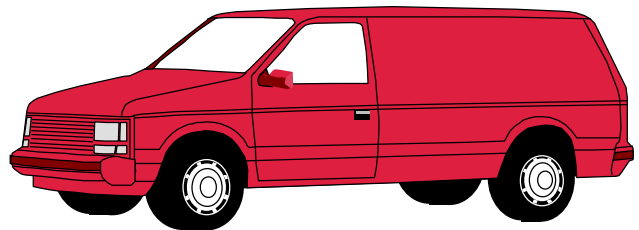
I think it was (they were) made in (England).

I don't know → where → it was → made.
I'm not sure → where → they were → made.

* * *

Rols-Roycers are made in England.

What about
Toyotas / Fiats/
Volkswagens/
Renaults/ Volvos/ ?



What about
Sony televisions? /Parker pens/ Boeing planes/ Kodak cameras/ IBM
typerwriters/ Honda motor-cycles/ Ronson lighters/ Philips cassettes?

* * *

A lot of things are made in England - cars, planes, televisions, boats.
 What things are made in your town? (fabrics, excavators, cranes, textile machines, precise tools)

* * *

Complete the sentences:

tea/India

wood/Sweden

wine/Spain

watch/Switzerland

vodka/Russia

oil/Saudi Arabia

cars/Japan

computers/America

QUIZ



- | | | | |
|--|----------|------------|----------|
| 1. The first book was printed in | France | Germany | England |
| 2. Jagger cars are made in | England | The U.S.A. | Italy |
| 3. John F. Kennedy was assassinated in | Houston | New York | Dallas |
| 4. Mount Everest was climbed for the first time in | 1953 | 1961 | 1957 |
| 5. The Eiffel Tower was built in | 1876 | 1889 | 1901 |
| 6. The motor car was invented in | 1850 | 1885 | 1903 |
| 7. Christopher Columbus was born in | Spain | Italy | Portugal |
| 8. Uranium was discovered in | 1932 | 1798 | 1944 |
| 9. Coffee is produced in | Colombia | Scotland | Canada |

10. Australia was
discovered in

the 17 th
century

the 16 th
century

the 18 th
century

LESSON III

С I. Прочитайте и переведите следующие интернациональные слова:

cubic /'kju:bɪk/, differential /'dɪfə'renʃəl/, formula /'fɔ:mjʊlə/,
generator /'dʒenəreɪtə/, refrigerator /rɪ'frɪdʒəreɪtə/, vector /'vektə/,
vibrator /vaɪ'breɪtə/.

С II. Прочитайте и запомните следующие английские слова. Сравните их с русскими словами, имеющими тот же корень:

attract	/ə'trækt/	притягивать
attraction	/ə'trækʃən/	притяжение (ср. аттракцион)
author	/'ɔ:θə/	автор
gravity	/'grævɪtɪ/	сила тяжести (ср. гравитация)
gravitation	/,grævɪ'teɪʃən/	сила притяжения (ср. гравитация)
mile	/maɪl/	миля
observe	/əb'zɜ:v/	наблюдать (ср. обсерватория)
observation	/,ɒbzɜ:'veɪʃən/	наблюдение
portion	/'pɔ:ʃən/	часть (ср. порция)
term	/tɜ:m/	термин
universal	/,ju:nɪ'vɜ:səl/	всеобщий (ср. универсальный)
universe	/'ju:nɪvɜ:s/	вселенная; космос; земля

С III. Прочитайте следующие слова и запомните их значения:

account for	объяснять
about	приблизительно
body	тело
decrease	уменьшать(ся)
decrease	уменьшение
density	плотность
depend on (upon)	зависеть
equal	равняться, равный

equation	уравнение
fall	падение, падать
height	высота
heavy	тяжелый
increase	увеличивать(ся)
increase	увеличение
law	закон
level	уровень
mean (meant, meant)	означать
move	двигаться
movement	движение
multiply by	умножать на
pound	фунт
refer to	ссылаться на...; относиться
stand for (stood for)	символизировать, означать что-либо
success	успех
successfully	успешно
surface	поверхность
validity	правильность, надежность
weigh	взвешивать
weight	вес

К IV. Переведите следующие словосочетания на русский язык:

1. the density of -- charge, gas, nuclei;
2. base, vector, cubic, differential -- equation;
3. water, ionization, power, sea -- level;
4. absolute, energy, engineering, quantum -- level;
5. contact, closed -- surface;
6. absolute, critical -- volume;
7. quantum, radiation -- law;
8. vector, quadratic -- equation;
9. vibratory, spiral -- movement;
10. cosmic, conductive, crystal -- body;
11. vibratory, Brownian, spiral -- movement;
12. equivalent, absolute, design, maximum -- weight;
13. the form, the radius, the atmosphere -- of the earth.

TEXT A. GRAVITATION, WEIGHT AND DENSITY



1. What is the weight of a body? It is simply the amount of the gravitational attraction of the earth for the object. This means that a body has weight only because it is near a very large object like the earth. If a one-pound stone (камень) is moved farther (дальше) from the earth surface, its weight decreases because the earth does not pull so hard (сильно).

In other words (другими словами), the weight of a body depends on how near the earth it is, but its mass is the same everywhere in the universe.

2. For example, two bricks (кирпичи) together have twice (в два раза больше) the mass of a single (один) brick, but if we take these bricks to the height of 1,600 miles, their weight will be about that of a single brick at sea level.

3. But a given volume of one material has a different weight than the same volume of some other material, because they have different density, for instance, we say that iron is "heavier" than wood (дерево).

4. The density of a substance is the weight of any portion (часть) of it divided by the volume. Stated as a formula $D = m/V$ where D stands for density, m - for mass and V - for volume. Of course, this equation may be solved for m and for V : $m = D \times V$ (m equals D multiplied by V); $V = m/D$ (Текст составлен по кн.: Freeman I. Physics made simple, p. 15-16, 20-21).

К V. Переведите следующие словосочетания на английский язык:

1. атомный, объемный -- вес;
2. заряженное, твердое -- тело;
3. плотность -- плазмы, энергии;
4. земная, контактная -- поверхность;
5. центр, плотность -- земли;
6. равный, молекулярный, большой -- объем;
7. энергетический, квантовый, технический -- уровень.

С VI. Прочитайте текст, выпишите из указанных абзацев английские эквиваленты для следующих предложений:

1 - Вес тела зависит от того, насколько оно близко к земле, но масса его везде одинакова.

2 - Их вес будет приблизительно равен весу одного кирпича на уровне моря.

4 - Это уравнение может быть решено для m и для V .

N VII. Подберите русские (А) и английские (Б) эквиваленты:

	А		Б
1. about	1. высота	1. поверхность	1. weight
2. mean	2. фунт	2. движение	2. volume
3. equal	3. равный	3. вес	3. earth
4. height	4. установленный	4. объем	4. density
5. stated	5. приблизительно	5. уровень	5. surface
6. pound	6. означать	6. земля	6. movement
7. heavy	7. тяжелый	7. плотность	7. level

D VIII. Составьте предложения, соединяя подходящие по смыслу части:

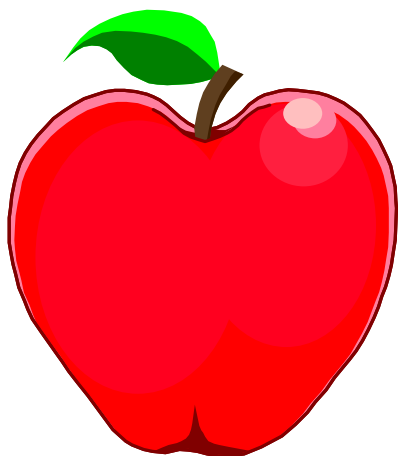
- | | |
|-------------------------------------|---|
| 1. A body has weight... | 1. greater than that of wood. |
| 2. The mass of a body is... | 2. the same everywhere. |
| 3. The density of iron is... | 3. when it is near the surface. |
| 4. The density of a substance is... | 4. the weight of any portion of it divided by the volume. |

С IX. Прочитайте и переведите следующие предложения, вставляя предлоги, где необходимо:

1. The weight ...a body is the amount... pull...the earth's gravity...it.
2. A body has weight, when it is near...the earth.
3. If something is far...the earth, its weight is less.
4. The weight... a body depends...how near the earth it is.
5. The weight... two bricks taken... the height...1,600 miles is that of a single brick... sea level.
6. The density... a substance is the weight...any portion of it divided... the volume.

TEXT B. GRAVITATION

The term "gravity" is usually used to denote (обозначать) the force with which the earth attracts bodies. The term "gravitation" is used for denoting the force of attraction which every particle of matter in the universe has for every other particle. Thus, "gravity" refers to the attraction of the earth for bodies; "gravitation" refers to the attraction of



any body in the universe for any other body. But some authors use the term "gravitation" for both kinds of attraction. For example, in one of the books on physics we may read, "The law of gravitation was the first of the great universal laws to be developed. It was proposed by Sir Isaak Newton in 1686 to account for the fall of the apple and motion (движение) of the Moon. Many experiments have been successfully performed to verify

(проверить) the law of gravitation and many observations vouch (подтверждать) for its validity". (Текст составлен по кн.: Henderson W.D. Physics guide and laboratory exercises. Chicago, New York, 1945, p. 5; An approach to physical science, p. 21).

С X. Прочитайте и переведите следующие интернациональные слова:

centimeter /'sentɪ,mɪ:tə/, gram /græm/, metric /'metrɪk/, millimeter /'mɪlɪ,mɪ:tə/, type /taɪp/.

С XI. Прочитайте и запомните следующие английские слова. Сравните их с русскими, имеющими тот же корень:

instrument	/'ɪnstru:mənt/	прибор (ср. инструмент)
primary	/'praɪməri/	исходный, первичный (ср. прима)
standard	/'stændəd/	эталон, стандарт; стандартный

С XII. Прочитайте следующие слова и запомните их значения:

able	/ˈeɪbl/	способный
area	/ˈeəriə/	площадь, территория
compare	/kəmˈpeə/	сравнивать
describe	/dɪsˈkraɪb/	описывать
etc.	/ɪtˈsetrə/	и т.д., и т.п.
follow	/fɒləʊ/	следовать
following	/fɒləʊɪŋ/	следующий
foot, pl. feet	/fʊt/, /fi:t/	фут
inch	/ɪntʃ/	дюйм
length	/leŋθ/	длина
long	/lɒŋ/	длинный
operate	/ˈɒpəreɪt/	работать
operation	/ˌɒpəˈreɪʃn/	работа
per	/pɜː/	в, на, за, с
place	/pleɪs/	место; помещать
require	/rɪˈkwaɪə/	требовать
simple	/sɪmpl/	простой
solar	/ˈsəʊlə/	солнечный
square	/skweə/	квадрат; квадратный
unit	/ˈjuːnɪt/	единица; блок; узел

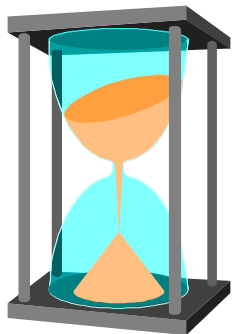
К XIII. Переведите следующие словосочетания:

1. effective, control -- area
2. telephone, teletype -- operator
3. base, cubic, differential, linear, quadratic, vector -- equation
4. absolute, direct, hydraulic, indirect, linear, nuclear -- measurement
5. depth, gravity, height, radiation -- measurement
6. earth's, capillary, magnetic, molecular -- attraction
7. nuclear, physical, absolute -- unit
8. the unit of -- area, measurement, mass

TEXT C. MEASUREMENTS

Physics is known as an exact (точный) science and this means that it is possible to make measurements of the things we talk about, because we must not only know how to describe things but be able to measure them.

There are many types of measurements. Some are very simple, others require the use of highly complex instruments.



The simplest kind of measuring operation is finding the length of an object. The fundamental length unit in the Metric system is the standard meter.

The following table gives the most commonly used Metric units of length: 1 kilometer (km) = (equals) 1,000 meters; 1 METER (m) = PRIMARY UNIT; 1 centimeter (cm) = 0.01 meter; 1 millimeter (mm) = 0.001 meter.

Length units in the English system: 1 in (inch) = 2.54 cm; 1 ft (foot) = 30.5 cm; 1 mile = 1609 m.

For area measurement we have square centimeters (cm²), square meters (m²), etc.

Volume requires a cubical unit for its measurement. Thus there are cubic centimeters (cm³), cubic feet (ft³), etc.

The fundamental Metric standard of mass is the kilogramme.

When we weigh an object we compare the mass of the object with that of the standard using the earth's attraction. (Текст составлен по кн.: Freeman I. Physics made simple, p. 18-19).

К XIV. Переведите следующие словосочетания и предложения на английский язык.

1. большая, маленькая, равная -- площадь
2. притяжение -- частиц, молекул, земли
3. простое, трудное, то же самое -- уравнение
4. единица -- длины, площади, веса
5. измерение -- высоты, глубины
6. простой, сложный -- прибор
7. сравните -- приборы, оборудование, установки
8. измерьте -- территорию, длину, глубину

J XV. Ответьте на следующие вопросы:

1. Why do we call physics as an exact science?
2. What kind of measuring operations do you know (length, volume, mass)
3. What are the exact commonly used Metric units of length?
4. Do you know the length units of English system? What are they?
(1 inch = 2.54 cm; 1 foot = 30.5 cm; 1 mile = 1609 m)

XVI. Изучите таблицу, ответьте письменно на вопросы, переводя цифры в слова:

PLANET CHART

Planet	How big across	How far from the sun	How many rings
Mercury	4,850 km	58 million km	none
Venus	12,140 km	108 million km	none
Earth	12, 756 km	150 million km	none
Mars	6,790 km	228 milliom km	none
Jupiter	142,600 km	778 milliom km	2
Saturn	120,200 km	1,427 milliom km	many
Uranus	49,000 km	2,870 milliom km	10
Neptune	50,000 km	4,497 milliom km	4
Pluto	out 3,000 km	5,900 milliom km	one

Образец:

How far is Mars from the sun? *Two hundred and twenty-eight milliom kilometres.*

- Ø How far is Mercury from the sun?
- Ø How many rings does Neptune have?
- Ø How big is the planet Saturn?
- Ø How many rings does Venus have?
- Ø How big is the Earth?

Прочитайте этот параграф и отгадайте имя планеты. Затем составьте свое описание.

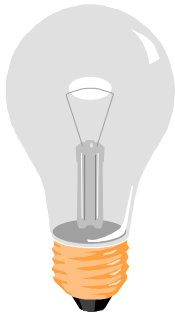
THIS Planet is twelve thousand, one hundred and forty kilometres across. It is one hundred and eight million kilometres from the sun. It has no rings.

LESSON IV

TEXT A.

UNITS MADE AFTER FAMOUS SCIENTISTS

Words like watt or volt have become part of our language so completely that we sometimes forget that these are the names of famous scientists.



Let us recall a few such units. An **ampere** is the unit of electric current in common use. It is that current which when passed through a solution of silver nitrate in water will deposit water (0,0001118 gram per second). The unit is made after Andre-Marie Ampere (1775-1836), the famous French physicist and mathematician.

A **bell** is a unit for comparing two values of power. It is 10 times the size of the more frequently used decibel, which is used as a measure of response in all types of electrical communication circuits. The unit is named after Alexander Graham Bell (1877-1922), the American inventor of telephone.

A **coulomb** /'ku:ləm/ is a unit of electric charge equal to the quantity of electricity transferred in one second by a current of one ampere. It is named after Charles Augustin de Coulomb (1736-1806), the prominent French physicist.

A **curie** (Cu) /kjuə'ri/ is the unit of the measurement of radioactivity. It is named after Pierre and Marrie Curie, French physicists.

A **farad** /'færəd/ is a unit of electrical capacitance. It is named after Michael Faraday (1791-1867), the famous English physicist.

A **gal** is a unit of acceleration used in describing the effects of gravity. It is an acceleration of one centimetre per second each second. This unit is named after Galileo Galilei (1564-1642), the prominent Italian scientist.

A **kelvin** is a degree on the thermometric scale that takes absolute zero as its starting point (0° K). It was named after Willian Thomson (1824-1907), who later became Lord Kelvin, a British professor, the inventor of mirror galvanometer.

A **newton** is the unit of force in the metre-kilogram second measurement system. It is named after Sir Isaac Newton (1642-1727), the English scientist, a professor of Cambridge University.

A **roentgen** /'rɒntʃən/ is a unit of radiation. It is named after Wilhelm Conrad Roentgen (1845-1923), the famous German physicist.

A **volt** /'vɒlt/ is the difference of potential between two points, if one joule of work is required to transport one coulomb of charge from one point to the other. It is named after Alessandro Volta (1745-1827), the Italian physicist.

A **watt** /wɒt/ is a unit of power. It is named after James Watt (1730-1819), the English inventor of a steam-engine.

Notes to the text:

a measure of response - мера чувствительности

electrical communication circuits - цепи электропередач

scale - шкала

C I. Проанализируйте предложения:

1) Words like watt and volt have become part of our language so completely that we sometimes forget that these are the names of famous people.

2) It is that current which, when passed through a solution of silver in water, will deposit silver.

3) It is 10 times the size of the more frequently used decibel, which is used as a measure of response in all types of electrical communication circuits.

K II. Запомните перевод следующих словосочетаний. Переведите:

Part of our language - часть нашего языка

Part of our life, part of our nature, part of his work, part of their task.

A few units - несколько единиц

A few students, a few books, a few elements, a few names.

Per second - в (на) секунду.

Per minute, per year, per mile, per month, per one person.

Is named after - назван в честь

After Mendelejev, after A. Bell, after Columbus, after Lord Kelvin.

For comparing - для сравнения

For measuring, for determining, for proving, for uniting.

By a current of one ampere - током в один ампер.

By a current of high density, by several watts, by some curies.

In describing - при описании

In measuring, in cooling, in heating, in studying, in making.

The difference between two points - разница между двумя точками.

Between the measurements, between two calculations.

From one point to another - от одной точки к другой.

From one city to another, from one task or another.

Is used as - применяется в качестве

As an instrument, as a professor, as a chemist, as engineer.

NB ! *AS* - так как, когда, по мере того, как

AS HE WAS YOUNG - т.к. он был молод

AS HE WAS A CHILD - когда он был ребенком

AS ... AS - также, как и, такой же как и ...

ALUMINIUM IS AS STRONG AS STEEL

AS TO - что касается (*As to my job...*)

AS WELL AS - также как и (*They study chemistry, as well as physics*)

@ III. Найдите в словаре значение следующих слов. Обратите внимание на специальные пометы (хим., тех., физ.):

Current, capacity, unit, acceleration, power, charge, solution, measure.

К IV. Переведите следующие группы слов, обратите внимание на суффиксы:

Science - scientist - scientific;

measure - measuring - measurement;

physics - physical - physicist;

invent - invention, inventor.

D V. Составьте предложения по модели:

Ampere is the famous French physicist. He is from France.

Пользуйтесь клише ***As far as I know... As to ...***

1. Bell is ... (America - American)
2. M.Faraday is ... (England - English)
3. G.Galilei is ...(Italy - Italian)
4. Lord Kelvin is ... (British - Britain)
5. W. Roentgen is ...(German - Germany)

* * *

What do you know about: I. Newton, A. Volta, G. Watt, P. And M. Curie ?

DVI. *Задайте вопросы с такой же структурой:*

A.-M. Ampere **was** the famous French physicist and mathematician, **wasn't he** ?

A bel **is** a unit for comparing two values of power, **isn't it**?

Michael Faraday **lived** in 1791-1867, **didn't he** ?

The mirror galvanometer **was** invented by W.Thomson, **wasn't it**?

You are a student now , ...?

Isaac Newton was a professor at Cambridge University, ...?

C.Roentgen is the famous German physicist,?

G.Galilei is Italian, ...?

You are Russian, ... ?

D VII. *Пользуясь формулами "запроса информации", спросите, кто что изобрел, открыл или описал:*

		invented telephone?
Could you tell me		opened the x-rays ?
Tell me, please	W H O	invented the steam-engine ?
I'd like to know		discovered radioactivity ?
		invented the mirror galvanometer?

? VIII . *Дайте определение следующих единиц, спросите в чью честь они названы:*

- 1) an ampere; 2) a roentgen; 3) a curie; 4) a farad;
- 5) a gal; 6) a bel; 7) a newton; 8) a watt.

A unit of power, a unit of electrical capacitance, a unit for comparing two values of power, a unit for measuring radioactivity, a unit of electrical current, a unit of acceleration, a unit of force in the metre-kilogram-second measurement system, a unit of radiation.

6 IX . *Продолжите предложения:*

- 1) We measure magnetic field intensity by
- 2) Two values of power are measured in ...
- 3) Radioactivity is measured in ...
- 4) Electrical capacitance is measured in ...
- 5) The difference of potential between two points is measured in ...

6X. *Перечислите по-английски все основные единицы измерения, применяемые в физике. Скажите, в честь кого из ученых они названы:*

Пользуйтесь конструкциями:

...is named after is a unit of is used for measuring

As far as I know ...

Слова для запоминания:

Science, scientist, unit, current, electric current, rate, physicist, mathematician, value, to measure, measurement, to invent, inventor, acceleration, scale, force, point, steam-engine, electric charge, quantity, point.

TEXT B. METRIC SYSTEM AND ITS ORIGIN

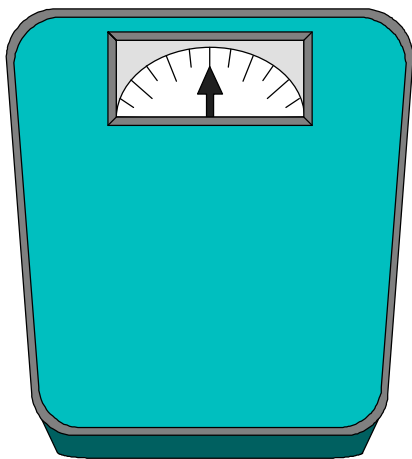
The idea of universal system of measurements and weights dates from long ago, but it was realized only two centuries ago. The metric or decimal system was worked out by the French Academy of Science in 1791.

How were the units for length and weight defined?

The two French scientists, who were given the task to define these

units, took one fourth of the distance from the North Pole to the Equator on the geographical meridian which is running through Paris (the distance from Dunkirk in France to Barcelona in Spain) and divided it into 10 million equal parts, one of these parts was called a metre or "measure". For shorter measurements the metre was divided by ten, for longer things the metre was multiplied by tens.

It was easy to use the same metre for volume. The weight of one cubic centimetre of water was called a gram. Thus the metric system was created.



Russian scientists played a great role in the spreading of the metric system in Russia as well as in other countries. The project of the law about the use other metric system in Russia was worked out by D.I. Mendeleev who set up the Board of Weights and Measures in Petersburg. This central state metrological institution was established in Russia earlier than in most countries (England, USA, Japan

and others).

It should be mentioned, however, that until the end of the 19th century different units of measurement were used in various countries.

In America, for example, such units as inch (")-2,54 cm, foot (') -12 in (3 m), yard -3 ft (9 m), mile -5.280 ft or 1.6 km are still widely used.

Notes to the text:

to work out - разрабатывать
decimal system - десятичная система
to define - определять
to divide - делить
to multiply - умножать
volume - объем
to spread - распространять

J XI. Answer the questions:

1. In what country and when was the metric system worked out?
2. How many parts was the distance on the geographical meridian divided?

3. What was called a gramme?
4. Who worked out the project of the metric system law in Russia?
5. What American length units do you know?

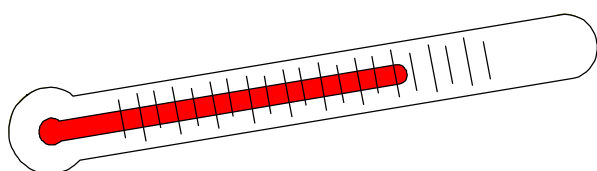
TEXT C. TEMPERATURE SCALES

Заполните пропуски в тексте словами в соответствующей форме:

Above, degree, improve, low, mix, mixture, oxygen, point, report, scale, through, zero.

Некоторые из слов могут употребляться дважды.

Daniel Gabriel Fahrenheit (1686-1736) gave his name to the temperature _____ which is still used in some weather _____. Fahrenheit was a scientific-instrument-maker from Holland. There is a belief that one day a cold winter wind came _____ the window of his room and froze his tea with milk on the table. This made him think of artificial _____ of low temperature. The lowest temperature Fahrenheit could produce in his experiments was with a freezing _____: the scientists _____ ice and ammonium chloride.



He called this temperature 0°F (zero degree Fahrenheit) on his temperature scale. Ice melted at 32°F and the normal human blood temperature was 96°F . The _____ modern version of the Fahrenheit scale uses 32°F and 212°F , as the _____ and highest _____ of the scale. The scale became popular both in Britain and throughout the English-speaking world.

Actually, the Celsius temperature scale is taught in all modern schools today. It was introduced in 1742 by the Swedish astronomer Anders Celsius (1701-1744), who chose the melting point of ice as 0°C and the boiling point of water as 100°C . The scale is between these points was divided into 100 equal _____ and was called a centigrade to the Celsius scale. The scale **was** simpler than Fahrenheit's, and was soon

adopted by scientists throughout the world. In 1948 it became officially known as the Celsius scale, which is now part of the International System of Units.

Another temperature scale, made in 1848 by the Scottish physicist William Thompson – Lord Kelvin (1824-1907), is given _____. Kelvin knew that when _____ and other gases were cooled, their volume became smaller. The lower the temperature, the smaller the volume. Experiments proved that at a certain temperature the gas had a volume of _____. At this temperature the molecules don't move, and their energy becomes zero. That represented the lowest possible temperature, and was called absolute zero on the Kelvin temperature scale. On the Celsius scale absolute _____ is -273.15°C .

У XI. Изучите таблицу и прочитайте по-английски приведенные в ней данные:

<i>Temperature :</i>	<i>F</i>	<i>C</i>	<i>K</i>
Freezing point	32	0	300
Room temperature	61-71	16-21	
Body temperature	98.6	37	
Boiling point	212	100	400

Daniel Gabriel Fahrenheit 'dænjəl 'geɪbrɪəl 'færənhaɪt
 Anders Celsius 'ændəs 'selsɪəs

FOR YOU TO BE DONE:

TEXT A. MASS, DENSITY, GRAVITY

A whole brick (кирпич) contains ... (a. more, b. less) matter than half brick. The quantity of matter which a body contains is called its ... (a. force, b mass).

We have a special name to denote (обозначать) the quantity of matter in a unit of volume, such as a cubic centimetre, a cubic inch, or a cubic foot. This name is ...(a. energy, b. itertia, c. density). Mass is the quantity of matter per unit of ...(a. length, b. area, c. volume).

Density, then, is a mass per unit volume or in equational form $D =$ (D is equal to m divided by ...).

For example, the density of water is ... gram per cubic centimeter (written: g/cm^2).

Another example: the density of mercury (ртуть) is 13.6 g/cm^3 (thirteen point six gram per cubic centimetre). This means that mercury is ...times as heavy (тяжелее) as an equal volume of water.

Gravity of the earth is the force with which the ...(a. earth, b. moon, c. sun) attracts bodies. A stone (камень) which is thrown upward falls back to the earth because of the force of... .

TEXT B. WEIGHT

Weight is the measure of ... a). density, b). energy, c). gravity, it is the force with which the ... attracts bodies towards its centre. The weight of a body depends upon two things. These are the mass of the body and the ... from the centre of the earth if not taking into consideration the rotation (вращение) of the earth.

For example the mass of a given body ... (a, is, b. is not , c. are) the same at sea level and on top (вершина) of the mountain (гора). The force of gravity, however, ... (a. is, b. is not, c. will be) the same for all places. The weight of bodies above or below the surface of the earth is ...(a. more, b. less) than at the surface, because the force of gravity is Any body (mass) taken up in a ballon (воздушный шар) will weigh ... (a. more, b. less) than at the surface of the earth and in the lake (подобный) manner, if taken down in a mine (шахта) it will weigh ... than on the surface.

Thus the weight of a body on the surface of the earth may vary from place to place, because for bodies on the surface the nearer the body is to the centre of the earth, the greater is the force of gravity and hence (следовательно) the ... is its weight. For example a given mass weighs 10 kg at sea level. Its weight on the top of the Elbrus will be ... (a. more, b. less) than 10 kg.

TEXT C.

WEIGHT AND MASS

Perhaps (вероятно) no two terms in physics give rise (порождать) to such confusion (путаница) in the minds of students as these - weight and mass. Let us look into this.

What is mass and what is weight? Mass is the quantity of... (a. energy, b. matter) in a body; it ... (a. does, b. does not) vary from place to place on the earth's surface. Weight is the measure of the pull of gravity and gravity ... (a. is always the same, b. may be different) for different places.

The confusion (путаница) which arises (возникать) in the use of these terms comes mainly from the fact that both mass and weight may be measured in grams or in pounds. Thus we may speak of the mass of a pound or the weight (force) of a pound. The force of the pound is equivalent to the pull of gravity for the mass of a pound ... (a. at any place, b. at sea level). When an object having the mass of a pound is taken from sea level to the top of a mountain, its mass ... (a. is, b. is not) changed but its weight is ... (a. increased, b. decreased).

Conclusion (заключение): Mass refers to the quantity of ...in a body, weight refers to the force of ... acting upon it.

TEXT D.

STRUCTURE OF MATERIALS AND THEIR IMPERFECTIONS

Engineers concerned with the design of various types of structures, machines and products must often select a material from a group of possible materials. In this selection, not only should the reported properties of the materials be considered, but - perhaps more important - their potential properties. These potential properties are dependent upon the chemical composition, structure, and the method of fabrication used. The properties may therefore be controlled and modified by both chemical and mechanical means. The stress - strain and other properties of materials are

influenced by the chemical composition and mechanical changes produced by fabrication, because these changes influence the structure of materials.

Solid materials are composed of crystals, fibers, grains, or similar units arranged in some geometrical pattern. For metals, the unit is the grain or crystal, which consists of a large number of atoms arranged in a definite manner called a space lattice. In a case of a nonmetallic material, the unit is usually a long chain molecule or fiber.

ПРЕДЛОЖЕНИЯ ДЛЯ ПЕРЕВОДА

1. In 1957 a research centre was founded in Siberia.
2. About a half of the physicists of the world work in the field of solid-state physics.
3. Russian scientists carry out research in many branches of modern physics.
4. The physicists of many countries are working at the problem of controlled thermonuclear reaction.
5. The physicists of the Joint Institute for Nuclear Research discovered the 104th chemical element.
6. At any point within a liquid the pressure is the same in all directions.
7. When the liquid cools and begins to crystalize, different regions of the liquid may begin to crystalize with different orientations of their growing crystal lattices.
8. The amount of pressure increases with the depth.
9. Pressure in a liquid differs from that exerted by solids.
10. Pressure within (in) a liquid is proportional to the depth and to the density of the liquid.
11. Liquid pressure is caused by the weight of the liquid.
12. Hydraulic presses are used for making different parts.
13. Various machines are designed at this research institute.
14. We have designed an appliance which provides the cooling of our instruments.
15. The heating effect of the electric current is used in many instruments (devices).
16. It is always important to know how much heat will be produced.
17. Electric current produces magnetic field.
18. The connection between magnetism and electricity was discovered more than a century and a half ago.
19. The magnetic effect of the electric current can be increased; a solenoid is used for this purpose.

20. The like poles of a magnet repel.
21. Electromagnets can hold loads of several tons.
22. Various particles may be current carriers.
23. Electrons may travel without a conductor.
24. Electric current is often compared to the flow of liquid through a pipe.
25. The unit of the strength of current is the ampere.
26. The speed of electrons is not high.
27. The function of the battery is to maintain the potential difference.
28. E.M.F. (electromotive force) is measured by means of a voltmeter.
29. Electrical resistance depends upon the kind of conductor, the length of wire and its cross - sectional area.
30. Electrical resistance also depends upon the temperature.
31. The unit of resistance is ohm.
32. Heat engines convert heat energy into mechanical work.
33. We know the law of the conservation of energy.
34. Hydrogen is the fuel of the future.
35. Energy was, is and will be the foundation of the economy.
36. We need ever more energy.
37. An atomic power plant is operating in Shevchenko.
38. Hydrogen is the lightest of all gases.
39. Hydrogen contains more thermal calories than gasoline.
40. Hydrogen is an ecologically clean fuel. But it does not exist in a pure form.
41. Hydrogen can be obtained from water.
42. The physical nature of the sun has been under investigation for more than 350 years, ever since the sun was first observed through a telescope by Galileo.
43. In 1912, Titanic hit an iceberg on its first trip across the Atlantic, and sank four hours later. At that time Titanic was the largest ship that had ever travelled on the sea. It was carrying 2207 people. When the passengers tried to leave the ship, only 651 of them were able to get lifeboats.
44. A great deal of attention is being paid to possible uses of lasers in war. Laser guns to blind enemy troops are being actively investigated.
45. The building of the new power plant was being completed when I came to live in that city.
46. Machine tools should be judged upon performance, not appearance.
47. Now brief-sized computers are being built and matchbox-sized computers are being talked about.

48. The term «growth» means a permanent increase in size and shape.
49. Automation is the application of mechanical, or more commonly, electronic techniques to minimize the use of the manpower in any process.
50. The corpuscular theory, as Newton's concept of light was called, accounted for many of the observed properties of light.
51. The atomic theory of John Dalton was the foundation stone on which the rapidly growing science of chemistry in the 19th century was built.
52. According to Bohr, the structure of an atom resembles a miniature solar system.

ТЕКСТЫ ДЛЯ ПЕРЕВОДА БЕЗ СЛОВАРЯ

Different metals are widely used in the machine-building industry. Metals applied for industrial purposes are called “engineering metals”. There are two types of metals: ferrous metals and non-ferrous metals. Non-ferrous metals are more expensive than ferrous metals. Their main characteristics are: high electrical and thermal conductivity, high corrosion resistance, non-magnetic qualities, light weight, etc. Some of the basic non-ferrous metals are: copper, tin, zinc, lead, nickel, gold and aluminium. Some metals are light, some are hard and others are soft.

* * *

A laser is a short form of “light amplification by stimulated emission of radiation”. It is a device that stimulates the electrons of a light-producing material to vibrate “in step” (simultaneously), giving off the light with tremendous energy. If we turn an infra-red laser light on granite or marble (мрамор), some seconds later they are as soft as sandstone. Laser light is widely applied in modern tunnel construction.

* * *

In 1826 Ohm found a simple correlation between resistance, current and voltage. He also observed that if the voltage remains the same, the greater the resistance, the smaller the voltage is. The unit of resistance is the Ohm.

PART II

LESSON V

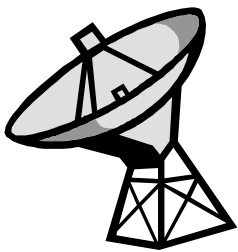
GRAMMAR: Passive Voice and Modal Verbs (revision).

TEXTS: 20th Century. Summing up...

TEXT A.

Read and analyze the text, find Passive Voice forms, Modal Verb:

Technology has made modern society possible. It has added to leisure time and reduced the long hours of work. Technology can allow the world to feed itself. It has reduced the effects of natural catastrophes. The world



is now a smaller place where people can communicate with each other and travel rapidly everywhere.

The establishment of the assembly line by Henry Ford in 1913 made automobiles inexpensive enough. Technology has raised the standard of living. The 20th century has become the century of many inventions. New materials (e.g. synthetic rubber, artificial fabrics and plastics) have affected the ways of life and fashion.

Electronics was ushered in when Marconi sent the first transatlantic radio message in 1901. Radio and television changed communications and entertainment habits. In 1948 the transistor was invented, and the era of modern computers was started.

In 1957 the Space Age began, when the first Earth-orbiting satellite – Sputnik was launched by the Soviet Union.

Medical technology was expanded by the use of new medicines and new equipment. New technologies in biology led to genetic engineering, in which living cells can be altered. In 1996 a lamb called Dolly has become the first large animal which was cloned from the genetic material extracted from the adult cell.

Technology keeps advancing at a rapid rate. It can only be guessed what the “information revolution” of the late 20th century will bring about.



NOTES:

Leisure time –	досуг
To feed (fed, fed) –	питать(ся)
Entertainment habits –	виды развлечений
To alter –	менять
Adult cell –	клетка взрослого организма
Keeps advancing at a rapid rate –	продолжает быстро развиваться
To guess –	догадываться

Exercise 1. *Find in the text all international words.*

Exercise 2. *Find English equivalents:*

Уровень жизни, искусственные ткани, новые лекарства, информационная революция, новое оборудование, первый спутник вокруг земной орбиты, каучук, радиосигнал, образ жизни, запускать на орбиту, сборочная линия, офисная оргтехника.



Exercise 3. *Answer the questions:*

- 1) What are the positive effects of technology?
- 2) What are the negative effects of technology?
- 3) What new technologies in biology can do?
- 4) What new materials were invented?
- 5) When was the new area of modern computers and office machines started?
- 6) Why is the first Earth-orbital satellite called all over the world as Sputnik?

Exercise 4. *Discuss the information below. The pattern: In 1938 nylon was invented by a group of American organic chemists. Use the verbs: to discover, to open, to invent, to establish, to launch, to introduce.*

- 1) An employee in the patent office of a New York firm, Chester Floyd Carlon, first dry copy, by attracting dry carbon powder to paper by static process, 1938.
- 2) 1960, Xerox Corporation, first automatic copier.
- 3) 1927, the first clothes washers.

- 4) 1945, the first sale of ballpoints at \$12.50 each.
- 5) In the late 1940's , remote controls for garage doors. In 1950, by Zenith Electronics, TV remote control.
- 6) 1971, Texas Instruments, the first electronic calculator.
- 7) In the late 1930's, the first tape recorder and wire recorder, Marvin Camras from the Illinois Institute of Technology.
- 8) In 1968, an American inventor D. Engelbart, computer mouse.
- 9) In 1990, world wide web (WWW) by CERN (The European Laboratory for Particle Physics).
- 10) In 1925, Commercial fax service.

Exercise 5. *Make up the sentences and tell*



WHO made WHAT.

Alexander Flemming _____ **special theory of relativity.**

Max Plank _____ split the atom.

Albert Einstein _____ quantum theory of light.

Ernest Rutherford _____ penicillin.

Ivan Pavlov _____ first motorized plane.

Wright brother _____ conditioned reflex.

Exercise 6. *Make up the sentences and name the main inventions of the 20th century.*



What of them do you enjoy?

What was invented at the year of your birth?

- 1901 – electric typewriter
- 1902 – airconditioner, speedometer, crayon.
- 1903 – skyscraper.
- 1904 – novocain.
- 1905 – animated cartoon.
- 1906 – vacuum cleaner, plastic.
- 1907 – cellophane, electric razor, paper cup.
- 1908 – cigarette lighter.



- 1911 – superconductivity.
- 1913 – artificial kidney, crossword puzzle, assembly line.
- 1914 – traffic light, zipper.
- 1915 – radiotelephone

1918 – electric food mixer.
1919 – short wave radio.

1920 – tea bag, submachine gun.
1921 – lie detector.
1922 – self-winding watch.
1923 – TB vaccine.
1924 – frozen food, spiral-bound notepad.
1926 – talking movies, liquid-fuel rocket.
1927 – tape recorder.
1928 – black and white television



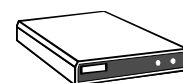
1930 – cyclotron, scotch tape, supermarket
1931 – electric guitar, FM radio, freon
1932 – color cartoon film
1933 – electron microscope
1934 – radar
1935 – beer can, Kodachrome film
1937 – xerography, radiotelescope
1938 – fluorescent lighting
1939 – DDT, helicopter



1940 – color television
1941 – aerosol can
1942 – nuclear reactor
1943 – all electronic calculating device
1945 – atomic bomb, microwave oven
1946 – mobile phone
1947 – transistor
1948 – cable television
1949 – super music amplifier

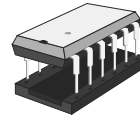


1950 – credit card
1951 – super glue
1952 – sex-change operation, answering machine
1953 – DNA
1954 – vertical – take off plane
1955 – lego, optic fiber, synthetic diamond
1956 – computer hard disk
1957 – IBM, sputnik, high speed dental drill



1958 – modem, ultrasound
1959 – electrocardiograph.

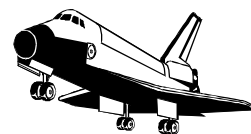
1960 – breast implant, fiber-tip pen, halogen lamp, laser.
1962 – audiocassette, laser eye surgery.
1963 – instant color film, videodisc.
1964 – acrylic paint, touch-tone phone, liquid crystal display.
1965 – potable video recorder, hologram, soft contact lenses.
1966 – fuel injection for autos.
1967 – heart transplant.
1968 – computer with integrated circuits
1969 – lunar landing.



1970 – floppy disk.
1971 – dot-matrix printer, space station, liquid crystal display.
1972 – word processor, compact disk.
1975 – laser printer, personal computer.
1976 – ink-jet printer, VHS system for video recording.
1977 – Apple II, fiber-optic communication
1978 – test-tube baby.
1979 – Rubik's cube.



1980 – hepatitis –B
1981 – MS-DOS, space shuttle.
1983 – cellular-phone, network, computer virus.
1984 – Macintosh computer, Random Access Memory
1985 – genetic fingerprinting.
1986 – digital audiotape.
1987 – 3-d videotape.
1988 – contact lenses.
1989 – high definition television.

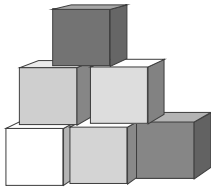


1993 – Pentium processor
1994 – microwave
1996 – web TV
1997 – cloning



TEXT B. HOLOGRAPHY

Translate the text in a written form using a dictionary:



Holography is a technique by which the image of a three dimensional object is recorded on film so that when the film is illuminated under the proper conditions, a three dimensional image of the object is created.

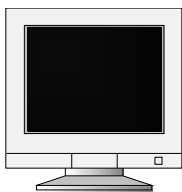
Holography was invented by Dennis Gabor, a Hungarian–born physicist. He was awarded the Nobel prize for physics in 1971. The development of the laser in the 1960s greatly improved the holograms.

TEXT C. 1926 – TELEVISION IS DEVELOPED

Read the text below and find the answers:

- 1) *Who and when applied for patent for a mechanical television?*
- 2) *With what corporation did the scientist work?*
- 3) *Who and when demonstrated a television receiver?*
- 4) *Who developed electronic television in Asia?*
- 5) *When was the first television station built?*

John Logie Baird (1888-1946) applied for a patent for a mechanical television in 1923. He made successful experiments in transmitting images in 1926, and in 1930 he worked with the British Broadcasting Corporation (BBC) to begin mechanical television broadcasting. He also tried, rather unsuccessfully, to mass-market his television transmitter.



In 1923 Vladimir Zworykin (1889-1982) also applied for a patent. His was for a television camera that converted optical images into electric pulses. On November 18, 1929, at a convention of radio engineers, Zworykin demonstrated a television receiver containing his “kinescope”, a cathode-ray tube. That same year Zworykin joined the Radio Corporation of America (RCA) in Camden, New Jersey. As the director of their Electronic Research laboratory, he was able to concentrate on his system and to improve it. Zworykin’s “storage principle” is the basis of modern TV.

Meanwhile, in Japan, Kenjiro Takayanagi was developing electronic television, too. He was ahead of Zworykin, but better publicity gave Zworykin the nickname “father of television”. Takayanagi transmitted an image electronically in 1926, with a 40-line resolution and film running at 14 frames per second.

In 1932 the BBC launched the first regularly broadcast programs using Baird’s mechanical equipment. The first special-purpose television was built in Germany in 1935 in preparation for the Berlin Olympic Games the following year. That Olympic year, NBC experimented with electronic broadcast from the top of the Empire State Building. In 1937 BBC began the first regular, high quality broadcasting service using an electronic system.



FALSE or TRUE?

- 1) J.L. Baird is the father of television.
- 2) Vladimir Zworykin was the famous Russian scientist.
- 3) Zworykin’s kinescope was a cathode-ray tube.
- 4) J.L. Baird worked with several American broadcasting corporations.
- 5) The first special-purpose television station was built in America.
- 6) The first regular, high quality broadcasting service using an electronic system was started by NBC.

Use the expressions: *quite right, you are wrong, I can’t agree with you.*

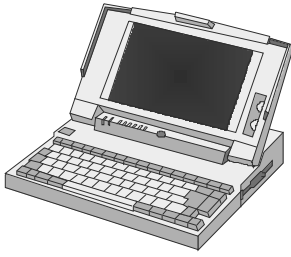
LESSON VI

GRAMMAR: Passive Voice and Modal Verbs (revision), Participles.
TEXTS: Computer System. BASIC.

TEXT A. COMPUTER SYSTEM

Read and analyse the text, find Passive Voice forms, Modal Verbs and Participles. Retell the text using a scheme:

A computer system consists of two parts: the software and the hardware. The software includes information in the form of data and program instructions. The hardware components are the electronic and mechanical parts of the system. The basic structure of a computer system is made up of three main hardware sections: the Central Processing Unit (CPU), the main memory, and the peripherals.



The CPU is the “brain” of the computer. It is contained of a single microprocessor chip which executes program instructions and coordinates the activities of all the other components. In order to increase the speed of the central processor, a co-processor chip can be installed inside the computer. This chip performs mathematical calculations very rapidly.

The main memory is usually composed of two sections: RAM (random access memory) and ROM (read only memory). RAM is a temporary type of memory that stores data and instructions that the CPU is working with at that moment. RAM contents are lost when you turn off the computer. However, ROM is a stable, permanent type of memory that stores the information necessary to start up and operate the computer.

The peripherals are the physical units attached to the computer. They include input and output devices as well as storage devices. Input devices enable users to give information to the computer; for example, the keyboard and the mouse. Output devices allow users to get results from the computer: e.g. we can see the output on the monitor or in printed form. Secondary memory devices such as floppies, hard disk, and optical disks are used to provide permanent storage of information.



Check if you know the following verbs:

To consist, to include, to make up, to contain, to execute, to increase, to install, to perform, to compose of, to turn on, to turn off, to store, to start up, to operate, to attach, to enable, to allow, to print, to provide.



Exercise 1. *Fill in the words:*

1. The _____ is the information in the form of data and _____ instructions. 2. The _____ components are _____ and mechanical parts of the system. 3. The _____ performs calculations very _____. 4. The CPU is a microprocessor _____. 5. The _____ memory keeps the instructions and the data which are currently being processed by the CPU.

6. RAM and ROM usually compose the _____ memory of a microcomputer. 7. The physical units attached to the computer are called the _____. 8. The keyboard and the mouse are the _____ devices. 9. _____ and _____ disks are secondary memory devices. 10. We can see the output on the _____ or in printed form.

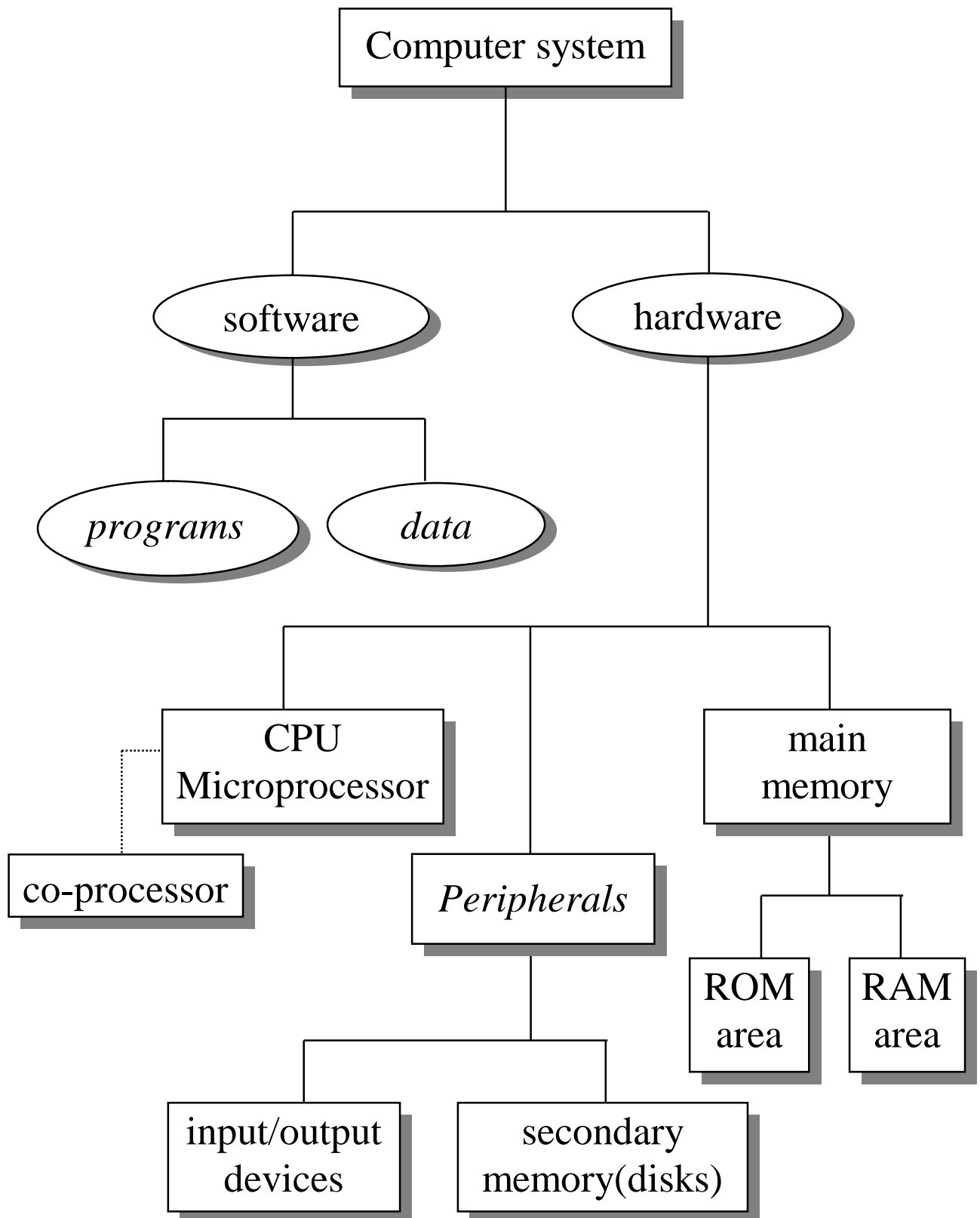
Exercise 2. *Decode the abbreviations:*


PC, ROM, CPU, RAM, CD-ROM, BASIC.

Exercise 3. *Find English equivalents in text A*

Программное обеспечение, устройство вывода, долговременная память, аппаратные средства, мозг, выключать, в напечатанном виде, жесткий диск, данные, центральный процессор, выполнять программу, микросхема, постоянное хранение информации, запускать, увеличивать скорость, оперативная память, дискета (гибкий диск).

A computer system consists of ...



 *Make up the sentences.*

- 1) The, is, the, “brain”, CPU, of, computer, the.
- 2) The, components, hardware, electronic, are, the, parts, and, of, mechanical, system, the.
- 3) The, software, in, includes, the, form, of, information, data , program, and, instructions.
- 4) The, are, the, peripherals, units, physical, to, attached, the, computer.
- 5) Input, devices, the, the, are, and, keyboard, mouse, the.
- 6) The, are, the, elements, software, written, programs, the, system, for.
- 7) Computer, used, system, in, laboratory, a, have, may, display, graphics, hardware.
- 8) To, process, together, data, working, of, components, is, a, computer, system, a, collection.



MEMORIZE:

<i>Process</i> /prəʊses/, <i>n</i>	технологический процесс, прием, способ; обработка информации
<i>Process</i> /prə'ses/, <i>v</i>	обрабатывать, подвергать процессу обработки (с изменением качества).
<i>Processor</i> /'prəʊsesə/	обрабатывающее устройство, процессор

Exercise 4. *Translate according to the models:*

N + Participle I (-ing) – функция определения

the languages operating (КАКИЕ ? – действующие)

the word meaning ... (означать)

the device reading ... (читать)

the device printing ... (печатать)

the screen showing ... (показывать)

the tools changing ... (изменять)

N + Participle II (-ed, 3 ф.) – функция определения

the system developed (КАКАЯ ? – разработанная)

the information accepted...	(принимать)
the instruction called a program...	(называть)
the cards punched...	(перфорировать)
the data output...	(выводить)
the process performed...	(выполнять)
the devices used...	(применять)
the text printed...	(печатать)
the text translated...	(переводить)
the instruction read...	(читать)
the application installed...	(устанавливать)

N + Participle I (-ing) Passive – функция определения

devices being used (КАКИЕ? применяемые)

the operation being performed
the applications being installed
the instructions being given
the text being printed
floppy disks being inserted

DISCUSSION:

WHAT COMPUTERS CAN DO IN PARTICULAR AREAS?

Here are some ideas:

In factories, computers are used to control machinery, robots, production lines, lists of products, etc.

In Formula 1, computers are used to design and construct racing cars. Computers help engineers to design the car body and the mechanical parts. During the races a lot of microprocessors control the electronic components of the car and monitor the engine speed, temperature and other actual information.

In entertainment...

In libraries...

WHAT ARE THE SPEAKERS' JOBS?

1) I use my computer to do the usual office things like write memos, letters, faxes and so on, but the thing I find really useful is electronic mail. We are an international company and we have offices all over the world. We're linked up to all of them by e-mail. With e-mail I can communicate

with the offices around the world very efficiently. It's really changed my life.

2) Well, I use computers for almost every aspect of my job. I use them to design electrical installations and lighting systems: for example the program will tell you how much lighting you need for a particular room, or how much cable you need, and it will show where the cable should go. I also use the computer to make drawings and to keep records. We have to test our installations every five years and the information is stored on computer.

TEXT B. BASIC

Translate the text in a written form:

Beginner's All – Purpose Symbolic Instruction Code or BASIC was originally developed by T.E. Kurtz and J.G. Kemeny at Dartmouth College in 1963-1964. The original version consisted of 14 statement constructions. BASIC was one of several languages operating in a general-purpose time-sharing system* also developed at Dartmouth. The simpler user commands, numbering about 8 or 10 have since become associated with the BASIC language.



A BASIC program is listed by the LIST command, executed by the RUN command and saved by the SAVE command. Previously saved programs are retrieved* from their file by entering LOAD and the desired program name.

Every program statement begins with an integer line number* and a statement keyword. Thus, assignment statements* are prefixed with ten integer labels and the keyword LET.

For example, “1150 LET X=B*B-4.0*A*C” computes $B^2 - 4AC$ and stores the result X.

BASIC manages three data types: (1) numeric variables, (2) string variables, and (3) one- or two-dimensional array variables of either string or numeric type.

Input-output is done in BASIC by the READ, INPUT, PRINT, and DATA statements, READ and DATA working together by assigning values from the DATA statements to the variable list in READ. INPUT and PRINT produce results at the user's terminal interactively.

Control is performed by GOTO, IF THEN, ON GOTO, FOR NEXT and GOSUB statements. The GOTO statement causes an unconditional

branch* to any statement in the program. The IF THEN statement causes a conditional branch (two-way), e.g. IF A+B THEN 350. The ON statement produces a branch to one of many statements depending on the value of a truncated integer index.

Subroutines are parts of the same global environment as the main program and other routines. Thus, all data is accessible to all program "Modules". A GOSUB 1000 causes subroutine invocation beginning with statement 1000 continuing until a RETURN is reached. The subroutine has access to any variable used in any other segment of the program.

BASIC is unusual in that variable names are limited to a single letter followed by an optional* digit if numeric, and further followed by a \$ if of type string.

The looping construct "FOR I+1 TO 10 ... NEXT I" is bracketed with a NEXT statement following the loop body, but the loop counter is tested upon entry of the loop.

Subroutines are defined by an instance a GOSUB, thus making modularity and scope a vague concept.



NOTES:

Retrieve – вызывать (из памяти машины), вернуть.

Time-sharing system – система с разделением времени

Integer line number – целочисленный номер

Assignment statement – оператор присвоения

String – строковый

Unconditional branch – безусловный переход

Subroutine – программа

Optional – произвольный

Loop – цикл, повторяющееся выполнение последовательности операторов.

Loop body – тело цикла, совокупность операторов, расположенных между операторами начала и конца цикла.

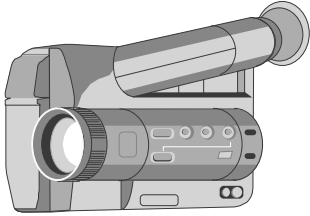
TEXT C.

A BOLD PLUNGE INTO THE DIGITAL YOUTH MARKET

Read the text and answer the questions:

- 1) *Whom are the new portable devices addressed?*
- 2) *What is “generation Y”?*
- 3) *What is “generation N” ?*
- 4) *Why will PCs play a smaller role in our life?*
- 5) *What digital devices do you have ?*
- 6) *What modern digital devices would you like to have?*

Samsung Electronics is keen to make a big splash in the IT world. It has a number of new digital consumer products and has plans for more. Many of them – incorporating multimedia, internet and e-mail functions in small, portable devices – are aimed at the young, whom the company regards as its market of the new future in the compressed timescale of the internet age.



Samsung talks enthusiastically about generation Y (the 13 to 25 year-olds) and generation N (internet consumers). It spent heavily on market research into these consumer groups and is investing some \$200m in online marketing of its new products this year.

Today’s children, teenagers and students are the customers of the future, says Mr. Chin, chief technology officer and executive vice-president of Samsung Electronics. Kids, the young generation, play games and do homework over the internet. When their parents take them to electronics product shops, the kids ask how many gigabytes, how many megabytes, how much megahertz are in the PC. Who is really determining what to buy? The kids.” “When they grow up, he adds, they will really use our products. So we actually searching for the needs, habits and tastes of this younger generation.”

Mr. Chin sees the time when the PC will play a far smaller role. “There will be an embedded computer somewhere. Internet connectivity can be achieved with many other products – mobile phones, PDAs (personal digital assistants), digital TVs. Even a microwave oven can be connected to the internet. Why do we need a PC?” He also sees an exciting future for home networking, with data displayed and printed on various connected devices.

Among the latest and planned offerings, mostly using Samsungs’ digital SmartMedia card, are: a portable digital audio player using MP3

compression technology, as well as one for downloading music and videos; a digital photo album; a web pad for easy internet and e-mail access; a web video phone, an e-diary with wireless access to the internet; and the world's first watch phone. The new products represent, as Mr. Chin says, "a basic shift in strategy, demonstrating our deep conviction that digital connectivity is the future of our industry".

(Information Technology, Financial Times Review, 2000)



FALSE or TRUE?

- 1) Samsung Electronics is one of the most famous American companies.
- 2) Samsung hopes for generation Y and generation N in future.
- 3) The Company invests much money in marketing of its new products.
- 4) In future Samsung doesn't plan to make a basic shift in strategy.
- 5) In electronic product shops the parents ask questions and choose what to buy.
- 6) It will be impossible to live without a PC at home.

Use the expressions: to my mind; it's quite right; far from it; I'm afraid, you are mistaken; nothing of the kind; you are wrong.



WORDS TO BE REMEMBERED IN LESSON VI:

Software, hardware, chip, main memory, CPU, to contain, to consist of, to compose, to include, to exclude, to install, to perform, to operate, to process, to store information, to input, to output, to print, keyboard, device, floppy disk, to provide, access, accessible, www, web, digital.

LESSON VII

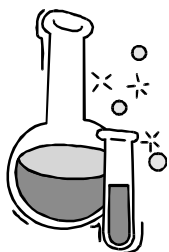
GRAMMAR: Participle, Absolute Participial Construction.

TEXTS: Water. Papermaking. The Beginning of Chemistry.

TEXT A. WATER

Water is a chemical compound of oxygen and hydrogen, the latter gas

forming two thirds of its volume. It is the most abundant of all chemical compounds, five seventh of the earth's surface being covered with water. As we know, water does not burn, on the contrary, it is often used for



putting out the fire. So, the two gases which it is composed of act in the opposite way: one of them – hydrogen – burns, the second – oxygen – making things burn faster than does air. Hydrogen is the lightest gas known, oxygen being slightly heavier than air.

Water is one of the most incompressible substances, the properties of a compound being incompressible unlike the elements of which it is made. By means of hydraulic accumulators water can be subjected to a tremendous pressure without appreciably reducing its volume.

Water like air is never found quite pure in nature but contains various salts and minerals in solution. Salt water being heavier, some things will float in it; hence, it's easier to swim in salt water. When sea water freezes, the salts separates from it, ice being quite pure.

Water applications are almost endless. Water is necessary for the existence of man, animals and plants, every living thing containing large amounts of water. Being a solvent of most substances, it is indispensable in chemistry and medicine. When used in engineering, its great resistance to compression enables it to transmit enormous power. When heated, water changes into an invisible gas; freezing it we get a solid block of crystals. When evaporated, it forms clouds and falls from them on the earth as rain and snow, the soil absorbing the water which appears on the surface again to begin a new cycle of evaporation. It goes round and round, the total amount of water on the earth never changing.

Exercise 1. *Check if you know these verbs:*

To cover, to burn, to make, to compress, to subject, to reduce, to contain, to float, to freeze, to separate, to transmit, to change, to evaporate, to fall, to absorb, to appear.

Exercise 2. *Analyse the structure of the words:*

Slightly, heavier, incompressible, unlike, various, compression, indispensable, evaporation, seventh, lightest, invisible smaller, hydraulic, tremendous, impure.



Exercise 3. *Find English equivalents:*

Последний из упомянутых, огромная сила, поверхность земли, как известно, наоборот, в отличие от, при помощи, общее количество. без заметного уменьшения, существование человека, незаменима в медицине, техника, напротив, невидимый газ.

Exercise 4. *Analyse and translate:*

1. fast – faster – the fastest; light – lighter – the lightest;
heavy – heavier – the heaviest;
 - a. great – _____ – the _____ , small – _____ – the _____ ,
 - b. easy – _____ – the _____ , strong – _____ – the _____ ,
 - c. big – _____ – the _____ , hot – _____ – the _____ .
2. Smaller space, lighter weight, heavier than air, faster than sound, the lightest gas, the largest amount, lower pressure, the highest temperature, the easiest process, the strongest alloy.



Exercise 5. *Answer the questions:*

- 1) What is water composed of?
- 2) What gases does it contain?
- 3) What are the properties of oxygen and hydrogen?
- 4) What is generally used for putting out the fire?
- 5) What gas makes things burn?
- 6) At what temperature does water become solid?
- 7) What is the freezing point of water?
- 8) How do we make ice liquid?
- 9) What can be compressed easier: a gas or a liquid?
- 10) What can reduce the volume of a gas?
- 11) Why must water be purified?
- 12) Why is the total amount of the water on the earth never changing?



Exercise 6. *Fill in the words and translate:*

1. Water is a _____ oxide, a compound of _____ and _____ .
2. Many mineral substances _____ water of crystallization and in the atmosphere there are millions of tons of water _____ .
3. Ordinary water is _____ , it usually containing dissolved salts and _____ .
- 4.

Water is one of the _____ substances known. 5. The _____ point of water is taken as 0°C and the point of water at 1 atm. is taken as 100°. 6. Water being the most important _____, it is indispensable in chemistry, industry, medicine.

vapour, hydrogen (2), gases, solvent, impure, freezing, contain, incompressible, oxygen, boiling.



Exercise 7. *Make up the sentences:*

- 1) A, water, is, chemical, of, oxygen, compound, hydrogen, and.
- 2) Is, it, the, abundant, of, most, all, compounds, chemical.
- 3) Water, not, burn, does, is, and, used, putting, for, out, fire, the.
- 4) Hydrogen, the, is, gas, lightest, known.
- 5) Water, air, is, like, never, quite, pure, found, nature, in.

1. Two gases _____ changes _____ act in the opposite way. 2. They _____ can be compressed _____ into a much smaller space. 3. Water _____ can act _____ as a solvent _____. 4. Hydrogen _____ is never found _____ into invisible gas _____ is often used _____ quite pure _____ forms _____ in chemistry and medicine. 5. It _____ is indispensable _____ two thirds of its volume.

Exercise 8. *Translate according to the models:*

A	<p>1. Water is a chemical compound of oxygen and hydrogen, the latter gas <u>forming</u> two thirds of its volume. Вода представляет собой химическое соединение кислорода и водорода, причем водород образует две трети ее объема.</p> <p>2. Rain <u>falling</u> on the ground, the soil absorbs the water. Когда дождь падает на землю, почва поглощает воду.</p>
---	---

1. The salt separates from freezing water, the ice being quite pure.
2. Water is never absolutely pure in nature, the amount of impurities depending on the locality.
3. When we drink water, it washes our system, the body being purified of poison.

4. The experiments with water containing substances being very interesting, we worked readily.
5. The range of water application being very wide, the scientists are interested in them.
6. Rain water being examined with a magnifying glass, they saw many impurities.
7. The experiment being very difficult, he has to spend much time in the laboratory.
8. A gas can be dissolved in liquid, the latter changing its boiling point.

B	<p>Water can be produced in the laboratory if the chemist mixes oxygen and hydrogen.</p> <p>Water can be produced in the laboratory, the chemist <u>mixing</u> oxygen and hydrogen.</p>
---	---

1. Aluminium is a light metal, but copper is much heavier.
2. Metals are seldom used in their pure form as alloys (сплавы) have better properties for industrial application.
3. As steel is one of the strongest metals, we use it for products where great strength is required.
4. As water is necessary for the existence of man, we drink water and receive it with many products.
5. While water like air is never found pure in nature, we usually purify it by various means.
6. Hydrogen doesn't burn, whereas oxygen supports burning.

 **Exercise 9.** *Analyse and translate:*

- 1) There are several different types of mixtures, some being homogeneous and others heterogeneous.
- 2) Salt can be obtained from salt mines, sea water.
- 3) The hydrogen atom, having its valence electrons in the first level, is small in the diameter than is the sodium atom.
- 4) The temperature remaining constant, the volume of a given mass is inversely (обратно) proportional to the pressure to which it is subjected.
- 5) The steam expanding, its volume increases.
- 6) Other conditions being equal, iron heats up faster than aluminium.
- 7) The experiments having been carried out, we started new investigations (исследования).

- 8) Oxygen combines with many elements, the product formed being called an oxide.
- 9) The gas being invisible, we didn't notice its formation.
- 10) Hydrogen being the lightest of elements, its density is the smallest of all substances.

TEXT B. PAPERMAKING

Translate in a written form:



The place paper occupies in modern life makes it as necessary as food and water. The art of papermaking was readily known some thousand years ago, bamboo fibres and rags being the principal material paper pulp was made of.

Water is one of the most important materials used in papermaking. The quality of the paper is determined to a great extent by the quality of the water and, in particular, the colour of the paper is seriously affected by the coloured impurities in the water the fibres are washed in during the pulping process. The presence of bacteria most process waters contain may lead to the formation of slime with consequent slime spots in the paper which chemicals and water successfully remove. Mechanical pulp or groundwood is made by grinding blocks of wood against the revolving abrasive stone in the presence of water. The process is relatively simple as it merely involves the wet grinding of the wood.

The wet pulp is fed on to an endless wire screen as a thin layer to remove as much of the water as possible. It is then passed between heated roll, a dry thin sheet of porous paper producing, such as filter paper, which is fairly pure cellulose (to be continued).



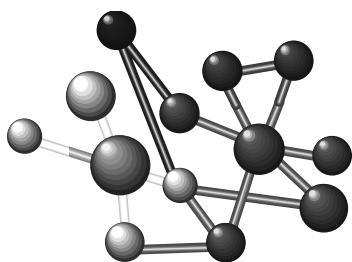
NOTES:

Abrasive –	наждачный, абразивный
Feed (fed, fed) –	питать, подавать
Fibre –	фибра, волокно
Groundwood –	древесная масса
Pulp –	бумажная масса
Rag –	тряпье
Slime	загрязнение

TEXT C.

BEGINNING OF CHEMISTRY

Although chemistry as we know it today is a young science, its history began several thousand years ago, when a great number of facts which are useful in modern chemistry were discovered.



Greece, Rome and especially Egypt, were the countries where a lot of knowledge about the world of nature was accumulated. But this knowledge was purely practical. People of this countries manufactured gold, silver, copper and iron but they did not know how these metals could be purified. They observed the changes of wine into vinegar but understood little why the process of fermentation took place.

Their doctors prepared medicines from plant material but could not tell what elements they consisted of. The credit for the foundation of our ideas about the structure of matter must be given to the ancient Greeks. Some philosophers thought that all kinds of matter could be made from air and fire, others believed there were four primary elements – fire, water, air and earth. Democritus who lived in the fifth century B.C. thought that all matter could be made by fusing small, indivisible particles together. Here we have the beginnings of the atomic theory of our day.



FALSE or TRUE?

1. Chemistry is an old science.
2. Ancient Greeks and Romans knew nothing about the world of nature.
3. People of Egypt, Greece and Rome could manufacture gold, silver and iron.
4. They knew even how to purify these metals.
5. Their doctors prepared various medicines from plant materials.
6. The foundation of the ideas about the structure of matter was made by Romes.
7. The philosophers thought that all kinds of matter consisted of four main elements.
8. Democritus lived in the 4th century A.D.

Use the expressions: to my mind, it's quite right, far from it, I'm afraid,

you are mistaken, nothing of the kind, you are wrong, on the contrary.

DISCUSSION:

- 1) When were the most important facts in modern chemistry discovered?
- 2) In what countries was a lot of knowledge about the natural world accumulated?
- 3) What metals could the people of those countries manufacture?
- 4) Did they understand the process of fermentation ?
- 5) The doctors could not tell the elements of which the plants consisted of, could they ?
- 6) Who founded ideas on the structure of matter?
- 7) What four primary elements were determined?

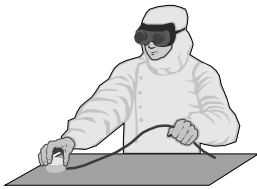
LESSON VIII

GRAMMAR: Participle and Gerund.

TEXTS: Machine-building Materials. Papermaking. Computer Dating.

TEXT A.

MACHINE-BUILDING MATERIALS



Different metals are widely used in the machine-building industry. Metals applied for industrial purposes are called “engineering metals”. There are two groups of metals: ferrous metals and non-ferrous metals.

Non-ferrous metals are more expensive than ferrous metals. The metals most frequently used to make non-ferrous metal castings are copper, tin, zinc, lead, nickel, gold, and aluminium.

Ferrous metals consist of iron combined with carbon, silicon, phosphorus and other elements. Carbon is the most important of all elements present in ferrous alloys. Ferrous metals are used in industry in two general forms: steel and cast iron, which differ in the quantity of carbon content. These two ferrous alloys are derived from pig iron which is produced in a blast furnace in the form of pigs. Metals are usually melted and poured into a form which is called a “mould”. This process is known as casting. The work of casting metals is performed in foundries.

Production of castings made from different metals requires different types of melting furnaces. The cupola furnace is usually used for melting

grey iron. The air cupola, and electric furnaces are used to melt the metal for making malleable iron castings. For melting steel the open-hearth, crucible or electric furnaces are used. In melting non-ferrous metals generally crucibles or electric furnaces are used. The fuels mostly employed for melting metals are coke, coal, oil and gas.

Besides the different types of furnaces, different kinds of moulding sand are also required for making the moulds for different metals.

Grammar study: GERUND

Melt + ing, experiment + ing, smoke + ing

Melting the metals.

For melting the metals.

In melting the metals.

The method of experimenting.

By melting the metals.

No smoking.

Exercise 1.

Translate:

By + GERUND:

by processing – при обработке, путем обработки

by boiling	(кипятить)
by performing	(выполнять)
by mixing	(смешивать)
by producing	(производить)
by obtaining	(получать)
by discovering	(открывать)
by alloying	(сплавлять)
by rubbing	(тереть)

Translate:

For + GERUND:


for processing – для обработки

for changing	(изменять)
for altering	(менять)
for operating	(действовать)
for combining	(соединять)
for employing	(применять)

for printing	(печатать)
for showing	(показывать)
for treating	(обрабатывать)
for separating	(отделять)

Find Gerunds in text A. Compare Participles and Gerunds:

Freezing water	a freezing point
<i>замерзающая вода</i>	<i>точка замерзания</i>
A smoking man	a smoking room
<i>курящий мужчина</i>	<i>курительная комната</i>
A reading girl	a reading room
<i>читающая девушка</i>	<i>читальный зал</i>

 **Exercise 2.** *Analyse functions of the Gerund and its translation:*

Подлежащее:

Solving practical problems is a difficult job (*решение, решать*)

Сказуемое:

Our aim is solving (*решение, решить*).

Дополнение:

He likes solving difficult problems (*решать, решение*).

I know of the problem having been solved (... *что задача была решена*)

Определение:

The way of solving the problem is not easy (*Решить...*)

Обстоятельство:

In solving the problem we made some mistakes (*Решая ...*)

On solving the problem he proceeded to make experiments (*Решив...*)

By solving the problem he got the required results (*Решая, решив...*)

You cannot do without solving the problem (... *без решения...*).

Exercise 3. *Analyse and translate sentences with Gerund:*

- 1) Copper is made for making electrical contacts.
- 2) Aluminium is extensively used in casting (отливать).
- 3) The work of casting metals is performed in special shops.
- 4) For separating iron from impurities the iron ore must be melted at a very

high temperature.

5) For melting steel various types of furnaces are employed.

6) By combining several metals we obtain alloys.

7) Magnets made by rubbing pieces of iron against natural magnets are called artificial magnets.

8) Scientists succeeded in developing means of obtaining a synthetic rubber.

9) The hardening process consists in heating steel and cooling it in water.

10) Analysing the facts is the first stage in the work of a scientist.



Exercise 4. *Check if you know these verbs:*

To use, to apply, to call, to differ, to combine, to derive, to produce, to melt, to pour, to cast, to perform, to require, to employ



Exercise 5. *Make nouns and Gerunds from the following verbs, translate them.*

To use _____

To apply _____

To produce _____

To combine _____

To perform _____

To employ _____

To require _____

Exercise 6. *Find English equivalents:*

Широкое применение, машиностроение, доменная печь, различные металлы, тигель, тигельная печь, вагранка, мартеновская печь, для промышленных целей, ковкий, технические металлы, черные металлы, цветные металлы, ковкие металлы, содержание углерода, топливо, литейная форма, отливка, литейная, чугун, специальный легированный чугун, серый чугун, ковкий чугун, чугун в чушках, плавить, плавильная печь, железо, кремний, фосфор, лить (отливать), формовочная смесь.



Exercise 7. Write out from the text:

Types of furnaces:

Types of fuel:

Types of metals:



Exercise 8. Fill in the words and translate:

- 1) _____ metals are widely _____ in the machine-building industry.
- 2) Metals _____ for industrial purposes _____ called “engineering metals”.
- 3) There are two groups of metals: _____ metals and _____ metals.
- 4) _____ metals consist of iron combined with carbon, silicon, phosphorus and other elements.
- 5) _____ is the most important of all elements present in ferrous _____ .
- 6) _____ metals are used in industry in two general forms: steel and _____ iron.
- 7) Two ferrous alloys are derived from _____ iron which is produced in a blast furnace in the form of pigs.
- 8) Metals are usually _____ and poured into a form which is called a “mould”.
- 9) This process is known as _____ .
- 10) The work of casting metals is _____ in foundries.
- 11) Производство _____ of castings made from different metals требует _____ different types of melting furnaces.
- 12) Вагранка _____ is usually used for melting grey iron.
- 13) Электродуговые _____ are used to melt the metal for making malleable iron castings.
- 14) For melting steel мартеновские _____ , тигельные _____ or electric furnaces are used.
- 15) In melting цветные _____ metals generally crucibles or

electric furnaces are used.

16) Топливо _____ mostly employed for melting metals are coke, coal, oil and gas.



Exercise 9. *Answer the questions:*

1. What are the engineering metals?
2. What are the two groups of metals?
3. What do ferrous metals consist of?
4. When are ferrous metals used?
5. What are the two general forms of ferrous metals?
6. Where is pig iron produced?
7. How are called the forms where two metals are melted and poured?
8. When is the cupola furnace used?
9. What is used for making malleable iron castings?
10. What is used for making steel?
11. What is used in melting non-ferrous metals?
12. What fuels are mostly employed for melting metals?

TEXT B.

PAPERMAKING (Continuation)

For making a paper that is suitable for writing and printing the pulp is mixed with a number of inorganic solids, for example clay and chalk, which lend rigidity to the paper.

Most papers are given a smooth coating by treating them with some substance like casein that can be ironed for forming the hard surface necessary for writing and printing.

By careful observation and practice one can judge the quality of good groundwood, when properly made, from its colour. When produced from partially decayed wood the pulp inevitably will be brittle and low in strength. A lighter coloured pulp will result from freshly cut wood.

The process of pulp manufacturing is improved: pulp is processed by automatic machinery.

TEXT C. COMPUTER DATING

Listen to the text and reproduce it. Discuss in pairs your likes and dislikes:

Interviewer: Come in.

Mr. Bull: Ah, good afternoon. My name's Bull... John Bull. I'm looking for a girlfriend.

Int.: Please, sit down, Mr. Bull. May I ask you some questions?

Mr. B.: Oh, yes... What about?

Int.: Music, for example... Do you like music?

Mr. B.: Yes, I do. I like classical music.

Int.: Do you like pop-music?

Mr. B.: No, I don't... and I don't like jazz.

Int.: How old are you Mr. Bull?

Mr. B.: What? I don't like personal questions!

Int.: Oh, well. Can you complete this form later and send it by post?



MEMORIZE!

GERUND:

I like dancing.

Do you like cooking?

He likes fishing.

Does he like driving?

She likes swimming.

Did your parents like swimming?

I like singing.

No smoking!

I like playing chess (football, hockey, tennis).

He dislikes drinking beer (milk, vodka).

She hates writing letters.

Match the sentences in English and in Russian.

We'll be able to go swimming tomorrow.

В следующие выходные мы сможем пойти на лыжах.

We'll be able to go skiing next week.

Завтра мы сможем поплавать.

We'll be able to go skating next Sunday.

Спасибо за приглашение на обед.

It is pleasant to go mushrooming in such weather.

Thank you for inviting me to dinner.

Thank you for coming.

It's high time to go shopping.

В следующее воскресенье мы сможем покататься на коньках.

В такую погоду приятно ходить за грибами.

Давно пора идти за покупками.

Спасибо, что пришли.

Make up your own phrases . Pattern:

It is pleasant to go skiing in such weather.

Memorize the proverbs with Gerund and Participle.

Seeing is believing. Лучше раз увидеть, чем сто раз услышать.

It goes without saying. Само собой разумеется.

Barking dogs seldom bite. Лающие собаки редко кусают.



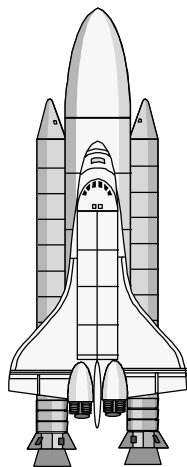
WORDS TO BE REMEMBERED AFTER LESSON VIII:

Metals: ferrous metals, non-ferrous metals, engineering, copper, tin, zinc, lead, gold, nickel, aluminium, iron, steel, cast iron, grey cast iron; cast, casting, alloy, alloying, melt, melting, mould, carbon content, furnaces: cupola, electric, open-hearth; fuel: gas, coke, coal

LESSON IX
REVISION AND CONSOLIDATION

TEXT 1

ALUMINIUM AND ITS ALLOYS (*for oral translation*):



Aluminium is a very important element used in many industries. Aluminium is a soft, silvery-white metal. It is light in weight, has high corrosion-resistant qualities and is used for automobile and airplanes parts as well as for making different light-weight objects used in everyday life. It is resistant to all inorganic acids except hydrochloric.

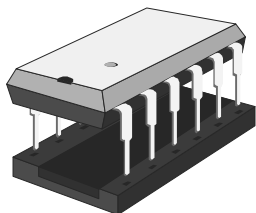
Aluminium is used extensively for castings. Aluminium is too soft for making castings, some other metals being mixed with it. The metals that alloy freely with aluminium are copper, zinc, and iron. Engineers often use combined metals in industry.

TEXT 2 ALLOYS

The most useful metals are iron, copper and aluminium. However, only small quantities of these metals are employed in their pure form. Most of useful metallic materials are formed from combinations of the above metals, known as alloys.

An alloy is a mixture of two or more metals melted together. For making alloys metals are usually mixed in their liquid state. A steel containing some metallic element other than iron and carbon is generally known as “special steel”. These various metals when added to steel in certain percentages (процентный состав), increase the hardness and the toughness of the steel.

TEXT 3 ELECTRONIC COMPUTERS



In the early 1940s the electronic computer was made with the mechanical relays replaced by vacuum tubes. These were, however, single-purpose computers designed to aid in the war effort*.

The first general-purpose electronic computer was ENIAC (Electronic Numeric Integrator and Calculator) that was put into operation at the University of Pennsylvania in 1946 – a 30-ton machine that contained over 17,000 vacuum tubes and performed 100,000 operation per second (1000 kilohertz, or kHz), 1000 slower than today’s mega hertz (or MHz) chips.

With the invention of transistors in 1948, vacuum tubes that generated a great amount of heat were replaced by small transistors that functioned perfectly as switches** and generated little heat.

By 1953 there were only about 100 computers in the entire world. They were huge** expensive machines. It was hard to imagine that one day machines that were hundreds of times smaller and thousands of times powerful would occupy most homes and offices.

* – для помощи в военных действиях;

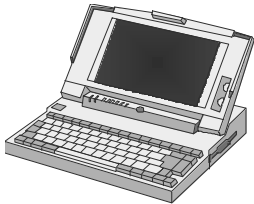
** – переключатели;

*** – огромный.

TEXT 4

PERSONAL COMPUTERS

The first integrated circuit for computers was developed in 1958. Only in 1971 was the microprocessor that contains all the basic elements of a computer on a single chip introduced, followed by desk-top computers in the mid-1970s.



Early computers were built as single-purpose machines, that is, they were built for performing a specific task. The first general-purpose ENIAC built in 1946 was programmable, but changing a program required rewiring* the machine!

The micromini computers of the 1970's and most in the 1980's followed the same pattern** and required extensive knowledge of common codes and function keys.

Apple Computer's Macintosh revolutionized the personal computer industry with a new machine. The user no longer has to memorize an operating system command for loading a program or file. Programs, functions, and files are represented by icons or small graphic images that can be selected with a mouse or other pointing device.

* – перепрошивать;

** – следовали тому же образцу.



TEST SENTENCES FOR TRANSLATION

- 1) The engineer succeeded in developing several projects every year.
- 2) Mendeleev having arranged the elements in a table, the existence of yet unknown elements could be predicted.
- 3) Let us begin by examining what is done by each student.
- 4) With the temperature falling rapidly, we could not proceed with our experiments out of doors.
- 5) Much of the data collected will be fed into computers during the coming months.
- 6) The instrument designed by this engineer was tested at our shop.
- 7) Having been tested, the new apparatus was recommended for work in

all the laboratories.

8) Electrons forming an atom are in motion.

9) By testing the metal we can define its mechanical properties.

10) The deformation test of a metal property is performed in a laboratory.

11) Bronze is an alloy containing primarily copper and tin, but other elements may be added to the alloy to increase its properties.

12) Copper is made for making electrical contacts and wires, pipes, telephone cables, water heater, etc.

13) Tin is hardly used in pure form, but is employed as an alloying element.

14) Phosphorous bronze may be made by adding a little phosphorus to the mixture.

15) Much could be written about the application of engineering metals.

16) This discovery followed by many experiments was of great use to scientists.

17) The work done at the laboratory was of great importance.

18) The temperature having been raised, the vapour began forming again.

19) With the experiments having been carried out, we started new investigations.

20) Any element when combining with oxygen forms an oxide.

21) Some of the metals are characterized by being unusually strong.

22) The expansive force of water in freezing is enormous.

23) Heat-resistant steel is made by adding some tungsten and molybdenum.

24) Some alloying elements make steel rust-resistant.

25) High carbon steel should be hardened by heating it to a certain temperature and then quickly cooling in water.

26) There are many applications of non-ferrous metals in the unalloyed state, but in most cases, some alloying element is added.

27) The atmosphere contains about 0.03% carbon dioxide.

28) The increased concentration of the ions of water increases the effects caused by these ions.

29) Lead, which is one of the metals mentioned in the Bible, was used in Rome in making water pipes.

30) In medieval (средневековый) alchemy gold, silver, copper, tin, iron, lead, and mercury were known as "The Seven Metals".

31) No unexpected difficulties have been met with during these experiments.

32) The discovery of electricity was followed by its wide application in

all branches of industry.

- 33) The new substance was allowed to stand overnight in a closed vessel.
- 34) The scientists had to create synthetic substances possessing better properties.
- 35) The higher the temperature, the quicker is the decomposition of a substance into its components.
- 36) When sodium hydroxide was allowed to dissolve in water, much heat was liberated.
- 37) It is to be remembered that the atmosphere is a mixture and not a chemical compound.
- 38) In shape, this input device is similar to an ordinary pen.
- 39) PostScript is a computer language that describes how to print text objects to different devices.
- 40) Multimedia is the integration of text, sound, graphics, animation and movies on the computer screen.
- 41) A database is used for storing, organizing and retrieving a large collection of related information.
- 42) “Updating” a file means making changes, adding new records or deleting old ones.
- 43) “Multitasking” means that several tasks are performed at the same time.
- 44) The process water must be specially conditioned for obtaining high quality paper.
- 45) Chemicals produce a purifying effect on cellulose.
- 46) Scientists succeeded in developing means of obtaining a synthetic rubber with properties similar to those of natural rubber.
- 47) Gold is not the only metal that does not corrode.
- 48) Nearly in every machine shop you may find many machines for working metals: they are generally called “Machine-tools” and are extensively used in many branches of engineering.
- 49) Rust formed in iron is different from metallic iron.



TEST YOURSELF:

- | | |
|-----------------|----------------------------|
| 1) to apply | 1) загружать |
| 2) to call | 2) вводить |
| 3) to differ | 3) производить, получать |
| 4) to combine | 4) требовать |
| 5) to drive | 5) применять. использовать |
| 6) to produce | 6) называть |
| 7) to melt | 7) соединять |
| 8) to process | 8) отличаться |
| 9) to cast | 9) плавить |
| 10) to perform | 10) отливать |
| 11) to require | 11) приводить в действие |
| 12) to load | 12) составлять |
| 13) to employ | 13) вводить |
| 14) to make up | 14) содержать |
| 15) to contain | 15) получать |
| 16) to input | 16) обрабатывать |
| 17) to generate | 17) применять |
| 18) to test | 18) занимать |
| 19) to design | 19) проверять, испытывать |
| 20) to occupy | 20) конструировать |

Иванова Наталья Кирилловна

**ОБУЧЕНИЕ ЧТЕНИЮ НАУЧНО-ТЕХНИЧЕСКОЙ
ЛИТЕРАТУРЫ**

УЧЕБНОЕ ПОСОБИЕ

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