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**Обучение чтению
научно-технической литературы**

(для студентов I курса технических специальностей,
изучающих английский язык)

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Учебное пособие «Обучение чтению научно-технической литературы» предназначено для аудиторных занятий со студентами I курса технических специальностей, изучающими язык специальности по программе бакалавриата, а также для самостоятельной работы студентов. Оно является основной частью УМК и используется в учебном процессе вместе с методическими указаниями по грамматике английского языка и методическими указаниями по обучению основам коммуникации.

Цель пособия – подготовить студентов к работе с оригинальной литературой, обучить необходимым лексико-грамматическим навыкам для извлечения информации из профессионально-ориентированных текстов, сформировать первичные навыки устной и письменной коммуникации.

Тексты каждого урока (А, В, С) позволяют осуществлять работу по обучению различным видам чтения, письму и говорению, закрепить полученные навыки работы с иноязычным текстом, а диалоги и творческие задания – усвоить определенный набор речевых клише, необходимых для коммуникации. Для развития навыков аудирования ряд упражнений и текстов имеет аудиовersion.

При составлении методических указаний использовались толковые словари, Интернет-ресурсы, а также следующая литература:

1. Андрианова Л.Н., Багрова Н.Ю., Ершова Э.В. Книга для чтения по английскому языку для заочных технических вузов.- М.:Высшая школа, 1980.
2. Гундризер В.Р. Учебник английского языка для технических вузов.- М.:Высшая школа, 1972.
3. Носова Н.Н., Пинзул Г.Е. Пособие по английскому языку для машиностроительных вузов. - М.: Высшая школа, 1970.
4. УМК Macmillan Guide to Science.- Macmillan, 2009.
5. Esteras S.R. Infotech. English for computer users. - Cambridge, 1996.
6. Hartley B., Viney P. StreamLine English.- Oxford, 1988.

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PART I

UNIT 1

FUNDAMENTAL PHYSICAL CONCEPTS

ПРЕДТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) Прочитайте и переведите следующие интернациональные слова:

atom /'ætəm/, characteristics /kærəktə'rɪstɪks/ chemist /'kemɪst/,
electron /ɪ'lektɹən/, element /'elɪmənt/, form /fɔ:m/, gas /gæs/, gaseous
/'geɪzjəs/, group /gru:p/, mass /mæs/, molecule /'mɒləkjʊl/, structure
/'strʌktʃə/, physics /'fɪzɪks /, philosophy /fɪ'lɒsəfi/, proton /'prəʊtɒn/,
reality /rɪ'ælɪtɪ/, physics /'fɪzɪks /, crystal /'krɪstl/.

2) 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)
packing	/'pækɪŋ/	упаковка

3) Прочитайте следующие слова, найдите их в тексте и запомните значение:

according to	согласно ч-л, по
air	воздух
angle	угол (матем.)
amount <i>n., v.</i>	количество, величина; доходить до...
call	называть

change <i>n., v.</i>	изменять; изменение
charge	заряд
common	обыкновенный, распространенный
compound	соединение
consist of	состоять из
con'vert	превращать
define	определять
definite	определенный
definition	определение
de'gree	степень, градус
example	пример
exist	существовать
fill	наполнять
flow, flowing	течь, течение, поток
iron	железо
keep (kept, kept)	держать, сохранять
kind	род, сорт, вид
liquid	жидкость
matter	материя, вещество
to measure, v, measure, n.	измерять, мера
to move	двигаться
oil	нефть
to occupy	занимать место, пространство
particle	частица
possible	возможный
resist	оказывать сопротивление, затруднять
shape	форма
space	пространство
solid state	твердое тело
state	состояние
steam	пар; выпускать пар
stone	камень
substance	вещество
thick	густой
thin	жидкий, текучий
viscosity	вязкость
volume	объем; громкость
zero	нуль

4) Переведите словосочетания на русский язык:

1. common (обычный) → *metals, compound, liquid*;
2. atmospheric, isothermal, thermodynamic → *changes* (изменения);
3. organic, meteoric → *matter* (вещество);
4. ideal, heavy (тяжелая) → *liquid* ;
5. atomic, electronic, critical, isomeric, normal → *state* (состояние);
6. absolute, molecular, nominal → *volume*(объем);
7. condensed, working, atmospheric → *steam* (пар);
8. according to (согласно ч-л) → *the new theory, this definition*;
9. crystalline, radioactive → *substance*;
10. static, dynamic, temperature → *characteristics*.



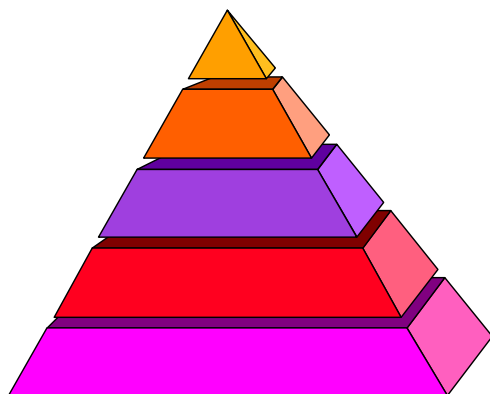
Запомните выражения:

that is why	ВОТ ПОЧЕМУ
similar to	ПОХОЖИЙ НА
on one hand	С ОДНОЙ СТОРОНЫ
on the other hand	С ДР. СТОРОНЫ
neither ...nor	НИ ..., НИ

5) Прочитайте и переведите текст. Запомните выделенные слова.

ТЕХТ А

FORMS OF MATTER



1. **Matter** is the physical substance that everything in the world is made of. Matter is everything that occupies the space. All matter has a mass, which is the measure of the particles, atoms and molecules, they consist of. Particles can be grouped together in many different ways, bearing the **structure** of matter. That is why, so different kinds of matter exist. All kinds of matter can be **classified** if they are solid, liquid or gas. Solid, liquid, gas and plasma are called **physical** states of matter. According to scientific **definition**, plasma is a substance similar to a gas that has almost no electric charge. This characteristics of plasma is used in plasma screens and plasma displays: a

mixture of gases is put between two sheets of glass. This produces a very clear picture which can be looked at from almost any angle. Iron and stone, oil and water, air and steam are the examples of different states of matter.

2. A **solid object** can keep a definite shape and a definite volume. A liquid also has a definite volume, but it 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).

3. A liquid is a substance that moves more **freely** than a solid, but not as freely as a gas. The tiny particles that make up liquid have more energy than the particles of solids, but less than gases. The ability of a liquid to resist flowing is called its viscosity. **Thick** liquids like syrup have a higher viscosity and flow slowly, whereas **thin** running liquids like water have a lower viscosity. In this case the substance flows more freely than a solid but less freely as a gas.

4. One kind of matter may be in all three principal 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.

5. 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.

ПОСЛЕТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) Проанализируйте состав выделенных слов. Найдите в тексте примеры наречий, прилагательных в сравнительной степени.


2) Переведите следующие словосочетания на английский язык:

1. твердое, газообразное, молекулярное, жидкое → *состояние*;
2. густое, жидкое → *вещество*;
3. определенный → *объем, вид, пример*;
4. обычный → *пример, объем, температура*
5. высокая, низкая, характерная → *вязкость*

3) Ответьте на вопросы по тексту А:

(Следите за структурой утвердительного предложения: подлежащее--- сказание--- дополнение.)

1. What is matter ? (Matter is ...)
2. What is a mass? (A mass is ...)
3. What are the four physical states of matter ? (The 4 physical states of matter are ...)
4. Why do different kinds of matter exist ? (Different kinds of matter exist as ...)
5. What kind of substance is plasma? (Plasma is ...)
6. Can a solid object keep a definite volume ? (A solid can/cannot...)
7. Does a gas have a definite volume and shape ? (A gas has/has no...)
8. What is velocity ? (Velocity is ...)
9. What states of water do you know ? (The states of water are ...)
10. In what state is iron in the sun ? (Iron is ...)

4)  *Послушайте тексты и установите, какая информация является в них новой. Передайте основное содержание по-русски и по-английски (Matter, Liquid, Gas)*

Matter

Liquid

Gas

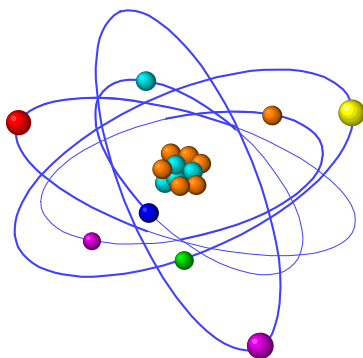
TEXT B

JAMES CLERK MAXWELL (1831-1879)

? Где учился Дж.Максвелл ?

Когда он написал свою первую научную работу ?

В каких областях физики работал ученый ?



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

After school he became the University student at his native 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 works 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.*

HELP: Where did J.M. ... (глагол в наст.неопр.времени) ?
What did he ... (глагол в наст.неопр.времени) ?

- *Разделите текст на логические части и озаглавьте их.*
- *Перескажите и обсудите текст.*

 *Послушайте аудиотекст Electricity, перескажите текст.*



TEXT C

APPLYING FOR A JOB

Dialogue № 1

1) *Проанализируйте диалог, обратите внимание на разговорные клише, выделенные курсивом, и на вопросительные и отрицательные фразы.*

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.

2) Заполните бланк:

Avon Gars Ltd. Birmingham, England

job _____

name _____

age _____

nationality _____

marital status Married

Single

education Secondary School

Technical School

University

Languages French

Spanish

Russian

Arabic

countries visited France, Germany, Russia (any other)

3) Составьте на основе заполненного бланка диалог, используя модели, приведенные в 1).

СЛОВА И ВЫРАЖЕНИЯ НА ЗАЧЕТ

☺ Air, angle, amount, to change, change, to charge, charge, common, compound, to consist of, to contain, to define, definite, degree, to exist, to flow, to keep, liquid, matter, to measure, to move, movement, motion, oil, to occupy, particle, physics, physicist, electromagnetic field, state, solid state, steam, substance, thin, thick, volume.

Neither ...nor, similar to, that is why, on one hand, on the other hand.

UNIT 2

THE PROPERTIES OF PLASMA

ПРЕДТЕКСТОВЫЕ УПРАЖНЕНИЯ

1). *Прочитайте и переведите интернациональные слова:*

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


2). *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	/ˈpɒzɪtɪv/	положительный (ср. позитивный)
----------	------------	-----------------------------------

3). *Прочитайте следующие слова и запомните их значения:*

charge	заряд; заряжать
discharge	разряд
complete	завершать, замыкать
completely	полностью
contribute	вносить вклад
contribution	вклад
divide by	делить на
heat <i>n, v.</i>	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
to subject	подвергать воздействию
thus	таким образом
therefore	следовательно
union	соединение, объединение

4).  *Прочитайте и переведите следующие пары слов. Работайте со словарем. Определите значение префиксов:*

- | | | |
|----|----------------------------|--------------------------------|
| a) | charge – dis charge | connect – dis connect |
| | colour – dis colour | arrange - dis arrange |
| | appear - dis appear | continue – dis continue |
| | place - dis place | compose - de compose |
| b) | ready – un ready | charge - un charged, |
| | connect – unconnected | stable – un stable |

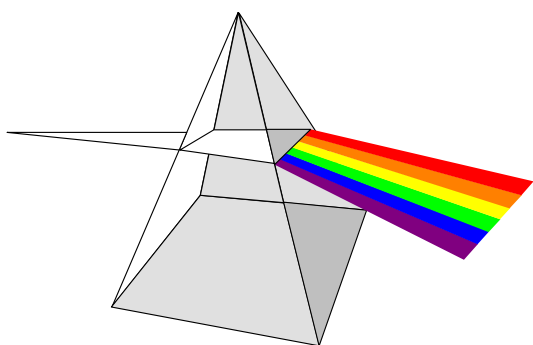
unused, undetected, unidentified, unmeasured, unreacting, unchangeable.

c) ultraviolet, ultramicrometer, ultramicroscope, ultramodern

5) Прочитайте и переведите текст. Запомните выделенные слова:

TEXT A

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 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.

ПОСЛЕТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) Переведите следующие словосочетания на русский язык:

1. electrical, electrostatic, negative, positive, zero → *charge*;
2. gas, electric, static, electron → *discharge*;
3. the heat of → *condensation, crystallization, reaction, formation*;

4. alpha, heat, beta, radioactive, cosmic, gamma, delta, x → rays;
5. molecular, complex, gaseous → *ion* ;
6. dynamic, dielectric, photoelectric → *properties*;
7. direct, indirect, absolute, nuclear, hydraulic, linear → *measurement*;
8. infrared, natural, polar → *light*.



Pronunciation (Произношение):

zero /'zɪrəʊ/	nuclear /'nju:kliə/
alpha /'ælfə/	hydraulic /haɪ'drɔ:lɪk/
linear /'lɪniə/	direct /dɪ'rekt/
beta /'bi:tə/	dynamic /daɪ'næmɪk/
delta /'deltə/	dielectric /daɪə'lektrɪk/
gamma /'gæmə/	cosmic /'kɒzɪk/

2) Найдите в тексте следующие словосочетания на английском языке:

1. атомное, радиоактивное → ядро;
2. медленный, атомный, нормальный → электрон;
3. инфракрасный, электрический, ультрафиолетовый → свет;
4. физические, основные → свойства;
5. частично, полностью → ионизированный газ
6. положительный, отрицательный, нейтральный → заряд

3) 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.

4) Составьте ПИСЬМЕННО 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, neutralizes, charge, the positive, the

5) *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

6) *Ответьте на вопросы по содержанию текста:*

1. What is the charge of the molecules of a common gas ?
2. What is the typical structure of hydrogen atom?
3. What is an ion ?
4. What is the ionized gas ?
- 5 What are the two kinds of the ionized plasma ?

HELP: Структура утвердительного предложения:
 (обст-во) подлежащее ---сказуемое --- дополнение (обст-во)

TEXT B
MADE IN ENGLAND



1) *Прочитайте и проанализируйте диалог :*

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.

2) *Составьте собственные диалоги:*

Where was your **watch** made?

pen
shirt
dress
jacket

Where were your **shoes** made?

socks
jeans
glasses
trousers

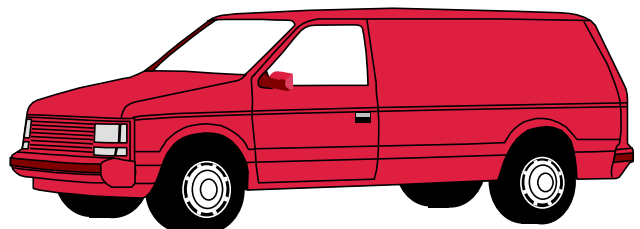
I think it was (they were) made in (England).

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

* * *

Rolls-Royces are made in England.

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



What about
Sony televisions? /**Parker** pens/**Boeing** planes/ **Kodak** cameras/ **IBM**
computers/ **Honda** motorcycles/ **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)

* * *

Составьте предложения:

tea/India

wood/Sweden

wine/Spain

watch/Switzerland

cotton/Egypt

vodka/Russia

oil/Saudi Arabia

cars/Japan

computers/America

tulips/Holland

Используйте в страдательном залоге глаголы **to make, to produce, to plant (выращивать)**.

TEXT C

PHYSICS. AN INTRODUCTION

Прочитайте текст, составьте письменно таблицу и ответьте на вопросы.

People have always wondered why things behave the way they do. Why things fall to the ground? Why are some types of stone hard and others soft? Why does the Sun come up in the east and go down in the west? These are all questions that physics can answer.

In the beginning, people answered questions like this in philosophical or religious ways. However astronomers from India, Egypt, China, Greece were able to use calculations to predict the movements of the Sun and the Moon, and even describe and build machines.

The works of eastern scholars reached Europe in the 12th and 13th centuries. There were studies of planetary motions by Indian astronomers, the theories of light from Buddhist and Persian thinkers. Eventually these ideas pushed Europe into a scientific revolution. Galileo laid the foundation for this with his work on dynamics, that is, how things move. Nocolas Copernicus and then Johannes Kepler described the solar system with the Sun at its centre. Later, building on their work, Isaac Newton set out his Laws of Motion and modern physics was born.

The next great idea of investigation was electricity and in the 19th century Michael Faraday first demonstrated an electromagnetic motor. Later, it was improved by James Clark Maxwell, whose equations were also used to describe light. In proving Maxwell's equations Heinrich Hertz discovered radio waves and Wilhelm Konrad Röntgen x-rays. Maxwell's work was also the starting point for Einstein's Theory of Relativity.

At the same time, other scientists were working on thermodynamics, that is, the study of changes of heat in matter. Physicists as Robert Boyle, James Prescott Joule and many others set out the theories that allow us today to make use of engines and other mechanical devices. Röntgen's discovery of x-rays and the work of Pierre and Marie Curie on radioactivity led to the development of the science of nuclear physics.

In the first half of the 20th century, developments in physics were connected with the structure of atoms. The parts of the atom were identified – its nucleus, protons and electrons, Eventually, in the 40s, scientists in the USA were able to split a nucleus and the result was the world's first nuclear explosion. Also at that time, scientists such as Max Planck were looking at the relationship between matter and wave motion. The field of quantum mechanics, which explains not only how atomic particles move, but how the universe does, came into being (появилась). Without physics to describe the way things behave, we would have none of the technology and machinery we take for granted today.

Кто исследовал	физическое явление	когда
Образец: Indian astronomers	studied planetary motion	Their findings reached Europe in the 12 th -13 th centuries.
1. Galileo 2. ...		



Pronunciation (Произношение):

Buddhist /'budɪst/

Einstein /'aɪnstain/

Persian /'pɜːzən/

Joule /dʒuːl/

Copernicus /kəʊ'pɜːnɪkəs/

Curie /kjuə'ri/

Faraday /'færədeɪ/

Hertz /hɜːts/

Röntgen /'rɔːntgən/

Galileo /gælɪ'leɪəʊ/

QUESTIONS

1. The scientists from what countries could use calculation to predict the movements of the Sun and the Moon?
2. What pushed Europe into a scientific revolution?
3. Who described the solar system with the Sun at its centre?
4. What was the starting point for Einstein's Theory of Relativity?
5. What studies led to the development of the science of nuclear physics?
6. What does the term "thermodynamics" mean?
7. What are the main scientific developments of the XX century?

QUIZ



1. The first book was printed in
France Germany England
a) b) c)
2. Nicolas Copernicus was
Polish Italian Russian
a) b) c)
3. John F. Kennedy was assassinated in
Huston New York Dallas
a) b) c)
4. A new non-Euclidian geometry was created by
Chebyshev Fermat Lobachevsky
a) b) c)

- | | | | |
|--|------------|-------------|-----------|
| 5. The Eiffel Tower was built in | 1876 | 1901 | 1889 |
| | a) | b) | c) |
| 6. The motor car was invented in | 1850 | 1885 | 1903 |
| | a) | b) | c) |
| 7. Christopher Columbus was born in | Spain | Italy | Portugal |
| | a) | b) | c) |
| 8. Uranium was discovered in | 1932 | 1789 | 1944 |
| | a) | b) | c) |
| 9. The nucleus of the atom was split for the 1 st time in | the USSR | the USA | Germany |
| | a) | b) | c) |
| 10. The laws of planetary motion and gravity were discovered by | M. Faraday | A. Einstein | I. Newton |
| | a) | b) | c) |

СЛОВА И ВЫРАЖЕНИЯ НА ЗАЧЕТ

☺ Complete, completely, to charge, charge, to discharge, contribution, to divide (by), to multiply, light, measure, to measure, measurement, nucleus nuclei, property, rate, state, to unite, union, unit.

Intense heat, positive charge, negative charge, x-rays, ultraviolet light, electrical discharge, electrically neutral, atomic nucleus, ionized gas.

Countries: England, Egypt, Japan, Holland, Russia, Italy, India, China, Germany, France, Sweden, the USA, Spain, Switzerland, Poland.

UNIT 3

WEIGHT. MASS. DENSITY

ПРЕДТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) Прочитайте и переведите следующие интернациональные слова:

cubic /'kju:bɪk/, differential /dɪfə'renʃəl/, formula /'fɔ:mjʊlə/, generator /'dʒenəreɪtə/, refrigerator /rɪ'frɪdʒəreɪtə/, vector /'vektə/, vibration /vaɪ'breɪʃən/, mile /maɪl/.

2) 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)
observe	/əb'zɜ:v/	наблюдать (ср. обсерватория)
observation	/əbzɜ:'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

3) Прочитайте следующие слова, найдите их в тексте и запомните значения:

account for	объяснять
about	приблизительно
amount	количество, величина
body	тело
de'crease, v.	уменьшать(ся)
'decrease, n.	уменьшение

density	плотность
depend on (upon)	зависеть
equal	равняться, равный
equation	уравнение
fall	падение, падать
height	высота
heavy	тяжелый
in'crease, v.	увеличивать(ся)
'increase, n.	увеличение
law	закон
level	уровень
mean (meant, meant)	означать
move	двигаться
movement	движение
multiply by	умножать на
pound	фунт (<i>англ. мера веса</i>)
refer to	ссылаться на...; относиться
stand for	символизировать, означать что-либо
to solve	решать (уравнение, задачу, проблему)
'surface /'sɜ:fəs/	поверхность
validity	правильность, надежность
weigh	взвешивать
weight	вес

4) Прочитайте и проанализируйте текст:

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, 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 together have twice the mass of a single 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 .

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); $V = m/D$.

ПОСЛЕТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) *Переведите на русский язык, обращая внимание на залог глагола:*

a body has weight, a stone is moved farther, its weight decreases; the weight depends on; we take two bricks; if two bricks were taken by us; a portion is divided by the volume, the equation may be solved; we can solve this equation.

2) *Переведите следующие словосочетания на русский язык:*

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

3) *Переведите следующие словосочетания на английский язык:*

1. атомный, объемный → **вес;**
2. заряженное, твердое → **тело;**

3. плотность → **плазмы, энергии**;
4. земная, контактная → **поверхность**;
5. равный, молекулярный, большой → **объем**;
6. энергетический, квантовый, технический → **уровень**.
(*Body, volume, surface, plasma, energy, weight, level*)

4) *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 .

5) *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

6) *Составьте ПИСЬМЕННО 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. |

7) Прочитайте и переведите следующие предложения, вставляя предлоги, где необходимо:

1. The weight ...a body is the amount ... the earth's gravity ...the object.
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

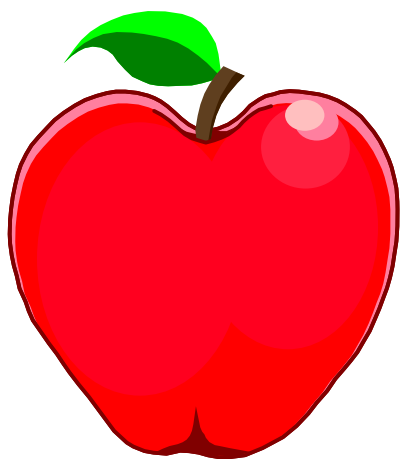
1) Прочитайте текст, пользуясь, при необходимости, словарем. Найдите ответы на следующие вопросы:

? Что такое **gravity** и **gravitation** ?

Кто и когда сформулировал закон притяжения ?

Почему этот закон называют универсальным?

The term "gravity" is usually used to denote 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 Isaac Newton in 1686, while observing things around him, to account for the fall of the apple and motion of the Moon. He realized that objects can be in one place without moving. He called this phenomenon inertia.

The force of gravity is the attraction of one object toward another. It is determined by the mass of the two objects and the distance between

them. The Law of Universal Gravitation is true everywhere and in all cases, not only on Earth, but also in space.

Many experiments have been successfully performed to verify the Law of Gravitation and many observations vouch (подтверждать) for its validity. The discovery of the Laws of Gravitation had a strong influence on scientific thinking for centuries.

2) 🎧 *Послушайте аудиотекст “Isaac Newton” и ответьте на вопросы, используя также информацию из текста В:*

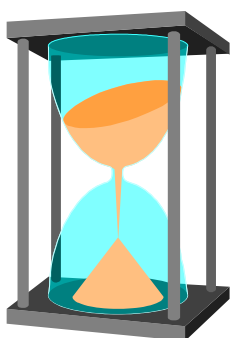
- 1) *Who and when discovered the Law of Gravity ?*
- 2) *What three laws did N. develop ?*
- 3) *What did N. split ?*
- 4) *What did he design?*
- 5) *What new branch of science did Newton initiate ?*
- 6) *What phenomenon was called him inertia?*
- 7) *Where is the Law of Gravitation true ?*
- 8) *What foundations were laid by Newton’s discoveries?*
- 9) *What was Isaac Newton ?*

TEXT C

MEASUREMENTS

Прочитайте текст и найдите ответы на следующие вопросы:

- ❓ *Почему физика является точной наукой ?*
Все ли измерения одинаковы ?
Каковы основные единицы измерения длины, площади, объема?



Physics is known as an exact 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 metre.

The following table gives the most commonly used Metric units of length:

1 kilometer (km) = (equals) 1,000 meters;

1 metre (m) = primary unit;

1 centimetre (cm) = 0.01 metre;

1 millimeter (mm) = 0.001 metre.

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 metres (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.

1) *Прочитайте и переведите следующие интернациональные слова:*

centimetre /'sentɪ 'mi:tə/, gram /'græm/, metric /'metrɪk/, millimetre /mɪlɪ'mi:tə/, type /taɪp/.

2) *Переведите следующие словосочетания:*

Образец: metric system ← study ← изучение метрической системы
← indirect sun influence ← — непрямоe воздействие солнца
(солнечное воздействие)

1. effective area **control**
2. telephone and teletype **operator**
3. linear equation **solution**
4. direct length **measurement**
5. depth and height **measurement**
6. earth's attraction **study**
7. absolute physical **unit**
8. mass and volume **definition**

3) *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. измерьте → **территорию, длину, глубину**

HELP: *particles, equation, height, width, instrument, length, area, molecules, square, weight, Earth.*

4) *Ответьте на следующие вопросы:*

1. Why do we call physics 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)

5) *Передайте основное содержание текста (по-русски, по-английски).*

6) *Изучите таблицу, ответьте письменно на вопросы, переведя 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 million kilometres.*

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

Прочитайте этот параграф и отгадайте имя планеты. Затем составьте свое описание, выбрав планету из списка выше.

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.

СЛОВА И ВЫРАЖЕНИЯ НА ЗАЧЕТ

☺ Attract, attraction, area, distance, density, describe, compare, equation, hard, heavy, high, height, laws of motion, law of gravity, long, length, light, measure, measurement, movement, move, motion, operate, operation, place, solve, solution, space, square, unit, weigh, weight, wide, volume.

To increase, increase, to decrease, decrease.

UNIT 4

METRIC SYSTEM AND UNITS OF MEASURING

ПРЕДТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) *Прочитайте и переведите следующие интернациональные слова:*

Idea /aɪ'diə/, system /'sɪstəm/, metric /'metrɪk/, meridian /me'riðiən/, geographical /dʒɪəʊ'græfɪkəl/, distance /'dɪstəns/, million /'mɪliən/, gram /græm/, role /rəʊl/. project /'prɒdʒəkt/.

2) *Прочитайте и запомните следующие английские слова. Найдите их в тексте.*

to date from – относиться к к-л. времени

to work out - разрабатывать

decimal system - десятичная система

to define - определять

to divide - делить

to multiply – умножать

to call - называть

to create - создавать

to spread /spred/ - распространять

to set up, to establish - основывать, создавать

Board of Weights and Measures – Палата мер и весов

should be mentioned – следует отметить

3) *Прочитайте и проанализируйте текст*

ТЕХТ А

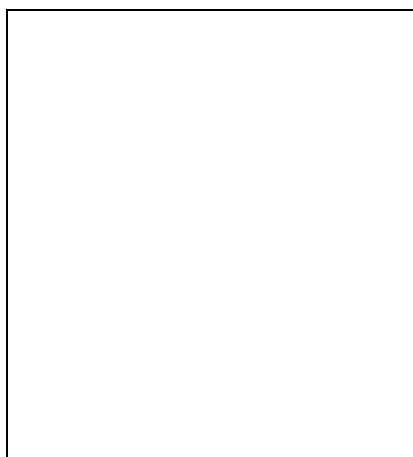
METRIC SYSTEM AND ITS ORIGIN

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 application of other metric system in Russia, instead of the traditional one, 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.

ПОСЛЕТЕКСТОВЫЕ УПРАЖНЕНИЯ

1) *Переведите следующие словосочетания на русский язык:*

1. metric, decimal → **system**
2. French, Spanish, Russian → **Academy**
3. length, width, weight, volume → **units**
4. English, American, Japanese, Italian → **scientists**
5. square → **centimetres, metres, kilometres**

2) *Переведите на русский язык словосочетания и составьте на их основе собственные по модели прилагательное + существительное:*

different units, various countries, long things, short things, equal parts, the same units, shorter distance, earlier times, German scientists.

3) *Заполните пропуски и переведите:*

1. The idea of universal system of measurements and weightsonly two centuries ago.
2. The metric or ... system was ... out by the French Academy of Science in 1791.
3. The two French scientists took one fourth of the ... from the North Pole to the Equator on the geographical meridian and ... it into 10 million equal parts.
4. For shorter measurements the metre was divided by ten, for longer things the metre was ...by tens.
5. The weight of one cubic centimetre of water was called a
6. Russian scientists ... a great role in the spreading of the metric system in Russia as well as in other countries.
7. The project of the law about the use of the new metric system in Russia was ... by D.I. Mendeleev.
8. In America such units as ... , ... , ... , ... are still widely used.

HELP: decimal, inch, foot, yard, mile, to work out, to realize, gram, distance, to divide, to multiply, to play,

4) *Ответьте на вопросы по тексту:*

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. In what Russian city was the Board of Weights and Measures set up ?
6. What American length units do you know ?
7. What old Russian units of measure do you know ?

TEXT B

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 silver (0,0001118 gram per second). The unit is named 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** /¹ku: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) /¹kjuə¹rɪ/ is the unit of the measurement of radioactivity. It is named after Pierre and Marrie Curie, French physicists.

A **farad** /¹færəd/ 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 Galiley (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** /¹rɒntjən/ is a unit of radiation. It is named after Wilhelm Conrad Roentgen (1845-1923), the famous German physicist.

A **volt** /¹vəʊlt/ is the difference of potential between two points, if

one joule /dʒu:l/ 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:

Let us recall – давайте вспомним
a measure of response - мера чувствительности
electrical communication circuits - цепи электропередач
scale - шкала

1) *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 Mendeleev, after A. Bell, after Columbus, after Lord Kelvin.
By a current of one ampere - током в один ампер.
By a current of high density, by several watts, by some curies.
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 unit of length, as a metre, as a standard

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

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

3) *Переведите следующие группы слов, обратите внимание на суффиксы:*

Science - scientist - scientific;
measure - measuring - measurement;
physics - physical - physicist;
move- movement- movable - motion - mobile
invent – invention - inventor.

4) *Составьте письменно 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.Galileo is ...(Italy - Italian)
4. Lord Kelvin is ... (British - Britain)
5. W. Röentgen is ...(German - Germany)

* * *

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

5). *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.Röntgen is the famous German physicist,?

G.Galileo is Italian, ...?

You are Russian, ... ?

You are not from France, ... ?

6). Пользуясь формулами "запроса информации", спросите, кто что изобрел, открыл или описал:

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

7). 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.

HELP: 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).

8). Продолжите предложения, запишите их:

- 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 ...

9). Перечислите по-английски все основные единицы измерения, применяемые в физике и химии. 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 ...



10). *Послушайте текст HEINRICH HERZ (1857-1894)*
и ответьте на вопросы:

1. Какая физическая единица названа его именем?
2. Работы какого ученого вдохновили Г. Герца?
3. Какое оборудование было создано Г. Герцем?
4. Какое изобретение доказало правоту ученого?

11). *Перескажите текст по - русски, по - английски. Пользуйтесь клише с глаголами в страдательном залоге:*

The unit ... was named for...

Herz was inspired by...

The existence of electromagnetic waves was predicted by ...

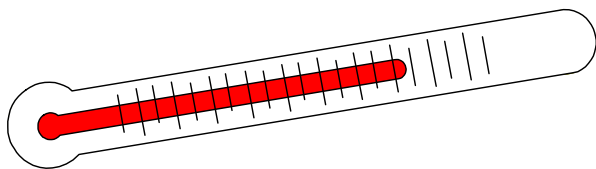
Their existence was proved by ...

The equipment was designed and built by ... for ...

TEXT C

TEMPERATURE SCALES

1). *Прочитайте текст, разбейте его на логические части, озаглавьте (письменно) каждую из них.*



Daniel Gabriel Fahrenheit (1686-1736) gave his name to the temperature scale, which is still used in some weather reports.

Fahrenheit was a scientific instrument-maker from Holland. There is a belief that one day a cold winter wind came through the window of his room and froze his tea with milk on the table. This made him think of artificial degree of low temperature. The lowest temperature Fahrenheit could produce in his experiments was with a freezing mixture: the scientist froze 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 lowest and highest points 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 parts 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 Thomson – Lord Kelvin (1824-1907) also exists. Kelvin knew that when oxygen 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 mixture. 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 zero is -273.15°C.

2) 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

Слова и выражения на зачет

☺ Science, scientist, scientific, unit, current, electric current, rate, physicist, mathematician, value, to measure, measurement, to invent, inventor, acceleration, scale, force, steam-engine, electric charge, quantity, boiling point, freezing point, to set, to establish, power, to work out.

UNIT 5 (Revision)

Подготовьте небольшие сообщения-презентации (на 5-7 минут) о великих ученых, имена которых носят некоторые единицы измерения.

Пользуйтесь дополнительными источниками (Интернет-ресурсы, энциклопедии, словари и т.д.). В качестве образца можно использовать текст В (Unit 1) J.C.Maxwell.

ТЕКСТЫ ДЛЯ ЧТЕНИЯ И ПЕРЕВОДА

FOR YOU TO BE DONE:

1) Выберите правильный вариант пропущенного слова, вставьте его в предложение, переведите.

TEXT 1.

MASS, DENSITY, GRAVITY

A whole brick 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. inertia, 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 $D = \frac{m}{V}$ (D is equal to m divided by a. mass, b. volume, c. weight).

For example, the density of water is 1 g/cm^3 (a. gram per cubic centimeter, b. gram for cubic cm).

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 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 which is thrown upward falls back to the earth because of the force of... (a.gravitation, b. inertia).

(876 ЗН.)

2) *Вставьте письменно пропущенные слова и переведите текст.*

TEXT 2

WEIGHT

Weight is the measure of 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 of the earth.

For example, the mass of a given body ... is the same at sea level and on top (вершина) of the mountain (гора). The force of gravity, however, ... is not 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 balloon (воздушный шар) will weigh ... (a. more, b. less) than at the surface of the earth , 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 (меняется) 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. (1000 ЗН.)

HELP : *distance, density, energy, gravity, Earth, less, more.*

1) Выберите правильный вариант пропущенного слова, вставьте его в предложение, переведите.

ТЕХТ 3

WEIGHT AND MASS

Perhaps, 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. (900 зн.)



Переведите письменно следующий текст, пользуясь словарем.

ТЕХТ 4

THE UNIVERSAL LAW OF GRAVITATION

In ancient times, people believed that the Earth was the centre of the solar system and tried to understand and explain the movement of the Sun, the Moon, the stars, and the planets around the Earth. As scientific knowledge and technology improved over time, this idea (called the *geocentric* theory) lost favour and new theories about the solar system were put forward.

Tycho Brahe (1546-1601) and Galileo (1564-1642) made accurate measurements of the heavens, which were the basis for later theories.

Nicolas Copernicus (1472 -1543) believed that the Earth was not the centre of the solar system but just another planet revolving around the Sun, which itself never moved. This type of theory was called *heliocentric*. Johannes Kepler (1574-1630), an assistant of Brahe, used Brahe's measurements to support Copernicus heliocentric theory. This led to his discovery of three laws relation to planetary movement, including the fact that the planets move in elliptical orbits around the Sun.

Isaac Newton expanded on these theories by testing and proving Kepler's laws. Numerous tests led Isaac Newton to his historic discovery of the Law of Universal Gravitation (or big G) . By calling his discovery a law, he meant that the relationships he had discovered were true everywhere and in all cases. (1116 ЗН.)

TEXT 5

GRAVITATION

Gravitation is a very important force in the universe. Every object has a gravitational pull which is like magnetism. But, unlike magnetism, gravitation is not only in iron and steel. It is in every object, large or small; but large objects, such as earth, have a stronger pull than small ones.

The sun attracts the earth, and the earth attracts the sun. The earth attracts the moon, and the moon attracts the sun. Although the bigger object has the stronger attraction, all objects, in fact, have some attraction too but we do not notice the gravitational pull of a book because the pull of the earth is much greater.

Gravitation is the force which holds all the atoms of a star together. It holds the sun together, and it holds the atoms of the earth together. It holds us on the earth.

Einstein produced a new law of gravitation. Its main results are the same as the results of Newton's law; but in very small and fine matters Einstein's law gives different results. (807 ЗН.)

TEXT 6

MICHAEL FARADAY

M. Faraday (1791-1867) was unusual among famous men in the 19th century. He was born in London to a poor family. He attended only a primary school, but educated himself. In the daytime he worked as

bookbinder and attended public lectures at the Royal Institution in the evenings. When H.Davy, one of the leading physicists of the time, injured his eyes in an explosion in his laboratory, he offered Faraday a job as his secretary.

Fortunately, M.Faraday had time to carry out experiments at the Royal Institution of Great Britain, although he was still Davy's assistant. In 1829 Davy died, and soon after Faraday began the series of experiments that would make him one of the most important scientists of all time. He managed to build the device which moved a magnet through a loop of wire. This motion of the magnet through the wire created an electric current. He demonstrated that a changing magnetic field produces an electrical field. He was helped by J.C.Maxwell to state the process mathematically (maths had always been Faraday's weakness), and this is now known as Faraday's Law of Induction. It is one of the foundations of electromagnetism and of modern technology. Later, Faraday build the first dynamo, a way of generating electricity. Without his discoveries we would not be able to enjoy the modern lifestyle that we have now.

(1129 зн.)

ПРЕДЛОЖЕНИЯ ДЛЯ ПЕРЕВОДА

(времена глагола в активном и страдательном залогах, модальные глаголы и их заменители).

1. In 1957 a research centre was founded in Siberia.
2. About 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 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.
53. 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.
54. It is that current which, when passed through a solution of silver in water, will deposit silver.
55. Bell 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.
56. 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.
57. I. Newton showed how the mass of the sun could be calculated from the speed and distance of any planet.
58. Newton established that the weight of the same body would be twenty-three times greater at the surface of the sun than at the surface of the earth.

59. In the book “Outside the Earth”, K.Tsiolkovsky, the famous Russian scientist, who worked out in 1895 the mathematical terms of space travel, assembled a group of outstanding scientists in an imaginary mountain laboratory: Galileo, Newton, Laplas, Helmgolz, B.Franklin and a modest Russian named Ivanov.

60. In 1820 it was discovered that an electric current could deflect a magnetic needle to the left, or to the right, according to the direction in which the current was flowing.

KEYS:

Unit 2, Ex.5

A	Б
1 - 5	1 - 1
2 - 7	2 - 7
3 - 1	3 - 2
4 - 2	4 - 6
5 - 3	5 - 3
6 - 6	6 - 5
7 - 4	7 - 4

Unit 3. Quiz

1. b	4. c	7. b	10. c
2. a	5. c	8. b	
3. c	6. c	9. b	

Unit 3, Ex.5

A	Б
1 - 5	1 - 5
2 - 6	2 - 6
3 - 3	3 - 1
4 - 1	4 - 2
5 - 4	5 - 7
6 - 2	6 - 3
7 - 7	7 - 4