

ФЕДЕРАЛЬНОЕ АГЕНТСТВО ПО ОБРАЗОВАНИЮ  
МОСКОВСКИЙ ИНЖЕНЕРНО-ФИЗИЧЕСКИЙ ИНСТИТУТ  
(ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ)

И.И. Кондратьева, Н.А. Некрасова

GRAMMAR AND VOCABULARY REVISION  
FOR THE EXAM

Учебно-методическое пособие  
для подготовки студентов III и IV семестров  
к государственному экзамену по английскому языку

*Рекомендовано УМО «Ядерные физика и технологии»  
в качестве учебного пособия для студентов  
высших учебных заведений*

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**Кондратьева И.И., Некрасова Н.А.** Grammar And Vocabulary Revision For The Exam: Учебно-методическое пособие для подготовки студентов III и IV семестров к государственному экзамену по английскому языку. — М.: МИФИ, 2008. — 96 с.

Пособие соответствует программе курса «Иностранный язык для студентов технических вузов». Содержит краткое, данное в схемах и таблицах изложение грамматических правил и большое количество упражнений; в нем также приводится объяснение основных лексических трудностей, с которыми студенты сталкиваются при переводе научно-технических статей. В пособии имеется материал по обучению пересказу текста, в него также включены рекомендации по организации и проведению студенческой учебной конференции.

Предназначено для студентов III и IV семестров технических специальностей МИФИ на всех этапах подготовки к экзамену. Его можно использовать в качестве проверочного и зачетного материала, как справочную литературу (особенно при самостоятельной работе студентов над переводами научно-технических текстов), а также как сборник упражнений при работе в классе.

*Пособие подготовлено в рамках  
Инновационной образовательной программы*

*Рецензент В.С. Штрунова*

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## СОДЕРЖАНИЕ

Предисловие .....	4
<i>Unit 1. Passive Voice</i> .....	5
<i>Unit 2. Modal Verbs</i> .....	11
<i>Unit 3. Subjunctive Mood</i> .....	15
<i>Unit 4. Verbals, General Presentation</i> .....	21
<i>Unit 5. Infinitive</i> .....	23
<i>Unit 6. Participles</i> .....	34
<i>Unit 7. Gerund</i> .....	46
<i>Unit 8. Emphatic Constructions</i> .....	54
<i>Unit 9. English-Russian Translator's «False Friends»</i> .....	58
<i>Unit 10. Miscellaneous</i> .....	63
<i>Unit 11. General Revision, Tests</i> .....	69
<i>Unit 12. Making Summaries</i> .....	73
<i>Unit 13. Students' Conference</i> .....	75
<i>Unit 14. The Exam Is Round The Corner</i> .....	77
Список использованной литературы.....	94

## ПРЕДИСЛОВИЕ

Данное методическое пособие разработано в соответствии с действующей программой по английскому языку для студентов III и IV семестров.

Основная цель пособия – предоставить студентам дополнительный материал при подготовке к государственному экзамену. Оно содержит не только объяснение и закрепление необходимого грамматического и лексического материала, но также тесты и задания на перевод, аналогичные заданиям в экзаменационных билетах. В нем даются рекомендации по реферированию (пересказу) текстов и проведению студенческой конференции. Здесь также разбирается довольно редко встречающаяся в подобных пособиях тема «Ложные друзья переводчика».

Авторы выражают благодарность Клементьевой Ольге Володаровне и профессору Шпире Виктору Исаевичу за помощь в редактировании данного пособия.

**UNIT 1. PASSIVE VOICE**

**Table 1**

	<i>Оператор + смысловый глагол</i>
Modal verbs	Must + V <sub>0</sub> Should + V <sub>0</sub> Ought + to V <sub>0</sub> , etc
Perfect Forms	Have/ Had + V <sub>3</sub> (= Participle II = Past Participle)
Continuous Forms	Be (am/is/are/was/were) + Ving (= Participle I = Present Part.)
Future Simple	Will/ Shall + V <sub>0</sub>

**Table 2**

Present Simple

	<i>I, We, You, They</i>	<i>She, He, It</i>
Утвердительные предложения	V <sub>0</sub>	Vs
Вопросительные предложения	D <sub>0</sub> + V <sub>0</sub> ?	Does + V <sub>0</sub> ?
Отрицательные предложения	Do not (don't) + V <sub>0</sub> .	Does not (doesn't) + V <sub>0</sub> .

Past Simple

	<i>I, We/, You/, She, He, It, They</i>
Утвердительные предложения	V <sub>2</sub> (=Past form)
Вопросительные предложения	Did + V <sub>0</sub> ?
Отрицательные предложения	Did not (didn't) + V <sub>0</sub> .

*Passive Voice (Страдательный Залог) образуется:*

**Table 3**

	<b>to be ( в нужной форме) + V<sub>3</sub> (= Participle II = Past Participle)</b>
Present Simple	am/ is/ are + done/ chosen/ written/ looked, etc
Past Simple	was/ were + done/ chosen/ written/ looked, etc

**Table 4**

<b>Оператор +</b>	<b>to be</b>	<b>+ V<sub>3</sub> (= Participle II =Past Part.) (в нужной форме)</b>
Must	be	done
Should	be	written
Ought	to be	read
Is	to be	chosen
Have	been	done
Had	been	said
Will	be	informed
Am/ is/ are/	being	discussed

**Ex. 1**

Use the verbs in brackets in the right forms. Translate the sentences.

1. The attraction between the molecules (to neglect — Present Perfect).
2. The positive particle in the nucleus of the atom (to give — Past Simple) the name of "proton".
3. Some pressing problems (to discuss — Future Simple) at the conference.

4. Recent discoveries (to assist — Present Perfect) greatly by the development of the research technique.

5. Any deduction (to precede — Present Simple) usually by a number of experiments and observations.

6. We (to inform — Past Simple) that a new idea (to advance — Past Perfect) at the closing session.

7. The results (must/ to show — Present) in a simplified form.

8. All the papers (have to/ to present — Future Simple) on time.

9. All the papers (to present — Future Perfect) by next Monday.

*Если в предложении употреблен страдательный залог с предлогом, то начинайте перевод с предлога управления.*

**NB! Запомните:**

agree on/upon — согласиться на

arrive at (a decision) — прийти к (решению)

bring about — вызывать, осуществлять

insist on/ upon — настаивать на

refer to — отсылать к, ссылаться на

refer to as — называться

rely on/upon — зависеть от, полагаться на

account for — объяснять, являться причиной

comment on/upon — комментировать что-то

deal with — иметь дело с, рассматривать, касаться

subject to — подвергать воздействию, оказывать воздействие на

touch on/upon — затрагивать, касаться

**Ex. 2**

Translate into Russian.

1. These properties are very rarely dealt with.

2. The substance wasn't subjected to any changes.

3. His idea should be commented upon.

4. Can her words be relied upon?

### **Ex. 3**

Translate into English using the words given above.

1. На этот доклад часто ссылаются.
2. На некоторые данные нельзя полагаться, так как они очень ненадежные.
3. Об этом новом открытии много говорят.
4. Во время обсуждения этот вопрос не был затронут.
5. Условия договора не были согласованы заранее.
6. Эта теория может быть подвергнута критике.
7. Эти события были вызваны открытием радиоактивности.
8. Эти явления объяснялись выше (above) .

### **NB! Запомните:**

#### **to follow**

- 1) следовать, идти за;
- 2) преследовать;
- 3) слушать, следить за словами;
- 4) придерживаться, пользоваться (методом и т.д.);
- 5) разделять взгляды, быть последователем;
- 6) сменить кого-либо, быть преемником.

### **Ex. 4**

Translate the sentences.

1. These effects have not yet been followed.
2. He spoke so fast that nobody could follow him.
3. The progress of the reaction can be followed by measuring the total pressure.
4. The war was followed by the revolution.
5. The process of concentrating small amounts of radioelements may be very conveniently followed by measurements of radioactivity.
6. The method described above is the most accurate and should be followed.
7. The discussion will be followed by an interpretation of the actual curves.



## **NB! Запомните:**

- call/ give attention to — привлекать/ уделять внимание  
make emphasis on — подчеркивать  
make mention of — упоминать  
make reference to — ссылаться  
make use of — использовать  
show preference to — ссылаться на, упоминать  
take account of — учитывать  
take care to do/ not to do — принимать меры  
предосторожности, стараться  
take care of — заботиться, учитывать, принять меры  
к тому, чтобы  
take notice of — заметить, обращать внимание на  
take steps to do — предпринимать меры  
take advantage of — использовать  
take measures — предпринимать меры  
make measurements — проводить измерения  
make an attempt to do smth — попытаться что-либо сделать

### **Ex. 5**

Translate the sentences.

1. Special attention has been called to the research work.
2. Use is made of a simple model of a molecule.
3. Steps are taken to diminish friction.
4. Account should be taken of the low melting point of the substance.
5. Advantage is often taken of the effect of temperature on solubility.
6. Care is to be taken to remove all the impurities.
7. Care is taken not to heat the substance.
8. An attempt was made to measure samples by immediately raising the temperature.
9. Attention was also given to the electron microscopic observation.
10. Emphasis is made on the evolution of the method.

**Ex. 6**

Translate the sentences. Use the following verbs in their passive forms:

to succeed, to influence, to attend, to affect.

1. На золото не оказывает влияния влажность.
2. На конференции присутствовали 27 астрономов.
3. Холод очень быстро воздействует на некоторые растения.
4. На скорость реакции влияет много факторов.
5. За первым открытием последовали другие.

**Ex. 7**

Translate the sentences.

1. It is believed that in many instances the explanations have been clarified.

2. None of the data on this state have been presented at the conference.

3. The experimental facts can be explained by this supposition.

4. A discussion of X-ray spectra has been omitted, as it can be found in almost any advanced text on physics.

5. The importance of water to living things is so evident, that it need not be insisted on here.

6. The invention of the nitrogen-filled lamps has been followed by the argon and neon lamps for special purposes.

7. The behaviour of a gas stream during expansion is influenced by a variety of circumstances.

8. The presence of slight traces of this substance in the atmosphere is accounted for by the action of ultraviolet light upon moist oxygen.

9. Many methods for detection of uranium have been proposed for use under various conditions and only a few can be referred to here.

10. The recognition that isotopes could exist was first forced upon chemists from the study of the radioactive elements.

11. Care must be taken in handling radioactive materials as painful and even dangerous burning may result from prolonged exposure to the rays.

12. Care should be taken in the laboratory not to inhale hydrogen sulphide.

13. Steps are taken to increase the production of our plants.

14. Chemical methods of purifying water are given much attention to at present.

15. The rate at which radioactive elements decompose is unaffected by change in temperature.

## UNIT 2.

## *MODAL VERBS*

### MUST

	<i>Должен, обязан, приходится делать...</i>	<i>Должно быть, скорее всего, я почти уверен...</i>
Present	must do have to do	must do must be doing
Past	had to do	must have done

### CAN

	<i>Умеет, может, способен что-либо сделать...</i>	<i>Мог бы, возможно ...</i>
Present	can do	can/ could be can/ could be doing
Past	could do	can/ could have done
Negative	<i>Не умел, не смог...</i> could not do	<i>Не может быть, чтобы...</i> cannot/ could not have done

## BE ABLE TO

	<i>Суметь, смочь что-либо сделать</i>
Present	am/is/ are able to do smth
Past	was/were be able to do smth
Future	will be able to do smth

## MAY

	<i>Разрешено, можно...</i>	<i>Может быть, существует вероятность ...</i>
Present	may do (Active Voice) may be done (Passive Voice)	may/ might do (Active Voice) may/ might be done (Passive Voice)
Past	allowed to do let do	may/ might have done (Active Voice) may/ might have been done (Passive Voice)

## SHOULD/ OUGHT TO

Present	<i>Настойчивый совет, следует сделать...</i>  should do ought to do
Past	<i>Следовало бы сделать, но не сделано...</i>  should have done ought to have done

## BE + TO INF.

	<i>По предварительному соглашению должен сделать...</i>
Present	am/ is/ are to do
Past	was/ were to do

## NEED

	Modal Verb <b>need do</b>	Full Verb <b>need to do</b>
Present	<i>Не стоит этого делать</i> need not (needn't) do it	<i>Нет необходимости это делать</i> do not (don't) need to do it
Past	<i>Зря это было сделано, не стоило этого делать</i> need not (needn't) have done it	<i>Не было необходимости, и не делали</i> did not (didn't) need to do it

### Ex. 1

Translate the sentences, explain your choice of modal verbs.

#### I.

1. Он не должен был сдавать экзамен в этом году, так как уже сдал его в прошлом.
2. Он не должен был сдавать экзамен в этом году, так как был очень плохо готов, и, конечно же, провалился.
3. Он теперь должен был работать сверхурочно (do overtime), так как не сделал работу вовремя.
4. Должно быть, ему кто-то помогал, он бы сам не справился (cope with it).
5. Я должен ему помочь, просто должен.

6. Ты не должен сам печатать письма, это делает секретарь.
7. Собрание начинается в 7.00, и ты не должен опоздать.
8. Я думаю, он должен прийти на собрание, он обещал.
9. Не должен я был приходить на это собрание, ничего интересного там не было.

## II.

1. Говори громче, я тебя не слышу!
2. Я не знаю, сам ли он сделал эту работу. Может быть, ему кто-то помог.
3. У него хороший слух (good ear for music), и он мог стать музыкантом, но не стал.
4. Он мог играть на скрипке уже в 5 лет.
5. Ты можешь (разрешаю) взять пирожное, но только одно.
6. Ребенок мог (разрешили) взять одно пирожное.
7. Он смог доплыть до берега, хотя почти не умел плавать.
8. Где он сейчас? – Не знаю, может быть, он читает...
9. Не мог бы ты показать, как этот прибор работает?

### *Ex. 2*

Translate the text. Explain your choice of modal verbs.

Пока меня не было дома, мой ноутбук сломался (to crash).

Что же могло случиться? Должно быть, младший брат играл на нем. С другой стороны, не может быть, чтобы он это сделал без моего разрешения.

Возможно, произошел скачок напряжения (abrupt voltage change). Мне надо было выключить компьютер (to shut down). Конечно, я знаю, что его всегда нужно выключать, если им не пользуются.

Боюсь, теперь придется покупать новый компьютер. Впрочем, я сначала должен поговорить со специалистами. Было бы очень хорошо, если бы они смогли починить (to fix) его быстро, потому что через неделю я должен сдать (to hand in) свою работу (project).

Видимо, все данные пропали, и мне вряд ли удастся их восстановить (to recover). Если придется все делать с самого начала, то мне может не хватить времени.

Мой научный руководитель должен вернуться с конференции через пару дней. Думаю, нужно будет с ним поговорить, может, что-нибудь посоветует. Хотя, конечно же, он скажет: «Не знаю, что

тут можно сделать (do about it), экзамены нельзя отложить (put off). Зря ты начал работу так поздно, нужно было хранить информацию (data) на диске, и не надо обвинять брата. Ты сам должен быть внимательнее». Да, дела — хуже некуда...

**Ex. 3**

Translate the sentences:

1. The substance under investigation doesn't need to be examined by chemical means.

2. Why should metals, even in the solid state, be excellent conductors of electricity, whereas salts ordinarily need to be melted before they will conduct?

3. One should keep in mind that the accuracy of Ohm's law fails for certain solutions when alternating currents of very high frequency are employed.

4. In order that this reaction should be valid two conditions must be observed.

5. It was already indicated that we should stop further discussion of the physical character of atoms.

**UNIT 3.**

***SUBJUNCTIVE MOOD***

	<b>If-clause</b>	<b>Main clause/ that-clause</b>
Present	<b>V<sub>2</sub></b> e.g. looked/ worked/ did/ taught, etc was/ were	<b>would/ should/ could/ might + V<sub>0</sub></b> e.g. would look/ should teach/ could be/ might work, etc
Past	<b>had + V<sub>3</sub></b> e.g. had looked/ had worked/ had done/ had taught/ had been, etc	<b>would/ could/ should/ might + have V<sub>3</sub></b> e.g. would have done/ should have taught/ could have been, etc

### Ex. 1

Translate the sentences.

1. Если бы эксперимент прошел удачно, мы бы уже: а) сидели и писали статью в журнал; б) уже давно написали бы эту статью.
2. У нас всегда не хватает каких-нибудь материалов. Если бы у нас было все необходимое, мы бы уже начали эксперименты.
3. У нас сломалась установка (facility). Если бы этого не произошло, то мы бы уже закончили испытания.
4. Жаль (wish), что я согласился делать этот доклад.
5. Хорошо бы (wish), чтобы на заседании на мой доклад не хватило времени.
6. На твоём месте я бы с ним не ссорился — он единственный человек, кто мог бы нас поддержать (back up).
7. У нее такая маленькая зарплата. Если бы она умела работать с компьютером, то могла бы найти более интересную работу.
8. Если бы он после школы пошел в университет, а не на работу, то уже в будущем году заканчивал бы его.

### NB! Запомните:

*Эти выражения употребляются с should + inf.,  
однако should может опускаться*

it is necessary that	—	необходимо, чтобы
it is important that		важно, чтобы
it is of importance that		
it is essential that	—	существенно, чтобы
it is desirable that	—	желательно, чтобы
it is likely that	—	вероятно, что
it is unlikely that	—	маловероятно, что
it is probable that	—	возможно, что

### Ex. 2

Translate into English.

1. Важно, чтобы все пришли.
2. Маловероятно, что они согласятся.
3. Возможно, они присоединятся к нам.
4. Существенно, чтобы температура не менялась.
5. Желательно, чтобы оборудование было новым.



*Слова “lest” и “unless” несут отрицательный смысл.  
Другого отрицания в предложении не будет!*

**NB! Запомните:**

- I. as if/ as though — как если бы  
so that — для того чтобы  
lest — чтобы не
- II. if — если  
in case — в случае если  
provided, provided that, providing, providing that — если  
on condition, on condition that — при условии, что  
even though — даже если  
suppose, supposing — предположим  
unless — если не

**Ex. 3**

Translate into English.

1. Если ты с ним не поговоришь, мы не узнаем правду.
2. Если ты с ним поговоришь, мы узнаем правду.
3. Поговори со специалистом, чтобы не сделать ошибки.
4. Поговори со специалистом, чтобы знать как поступить.

**Ex. 4**

Translate the sentences.

1. If the acid were purified the reaction would take place.
2. We must keep this gas in a special vessel lest it be evaporated.
3. It is necessary that the type of the reaction be determined.
4. It is suggested that only logarithmic plots for each point be made.
5. It is essential that the substance be chemically pure.
6. If there were no air the stone and the piece of paper would fall together.
7. It is desirable that this method should be recommended.
8. This would result in hydrogen production reaction taking place.

9. The world itself behaves as if it were an enormous but weak magnet.

10. The geometric properties of a crystal are the same whether a crystal be large or small.

11. Magnetism is often treated as if it were a subject as fundamental as electricity.

12. If the model fits well, the observed data will be correct.

13. Unless computer techniques had been developed, space research would have never made such great progress.

14. If the life had come to the so-called equilibrium, it would never have progressed beyond amoeba.

15. A valuable contribution would be made, if considerable efforts were devoted to the theoretic examination.

16. Unless the widening were small, this spectrum would not be very faint compared with others.

17. It is natural that aluminium should receive a great amount of attention from research workers with the view to improving the mechanical properties of the metal.

*Предложения с инверсией переводятся на русский язык полным предложением.*

**NB! Запомните:**

<i>Если бы...</i>	(Present) If it were done,... (Past) If it had been done,...	(Present) Were it done,... (Past) Had it been done,...
	(Present) If it should happen,... (Past) If it should have happened, ...	(Present) Should it happen,... (Past) Should it have happened, ...
	(Present) If it were to happen, ...	(Present) Were it to happen, ...

**NB! Запомните:**

<i>Если бы не...</i>	<b>Present</b>	<b>Past</b>
	If it were not for (him, her...) Were it not for ...	If it had not been for (them, us ...) Had it not been for ...
<b>But for</b>		

**Ex. 5**

Translate the sentences.

1. Were one electron removed, a net positive charge would be left.
2. Had the degree of evaporation been high, the salinity of water would have been rising.
3. But for radioastronomy, we should have never made the remarkable discoveries in the Universe.
4. There would be no increase in current at all, were it not for a small effect of voltage.
5. Should it be desirable to divide these two substances, several ways are possible.
6. Should your work meet these conditions, it will be of great service to our industry.
7. Had it not been for a large size of this body, we should have already weighed it on our scales.
8. But for space meteorological stations we would not be able to observe the formation of hurricanes.
9. Had this warning been needed, the reaction might have taken quite a different turn.
10. Providing that a profound change were to occur, slip (скольжение) ought to take place along the direction of maximum stress (линия максимальной нагрузки).
11. When an object is dropped it seems to go faster at least if it be large and massive.
12. If two hydrogen atoms were to collide each should obtain an additional electron.
13. Should the content of this volume prove of any assistance to the students, the author will feel completely rewarded.

14. But for the luminosity of this substance it would be difficult to detect its properties.

15. If concentrated sulphuric acid be mixed with hydrogen at low temperature to prevent heating, oxygen rich in ozone is evolved.

### **Revise Units 1, 2, 3.**

1. Let us picture what ought to happen provided there were a conducting wire between two points of unequal potentials.

2. In order that the compound might be used it had to be purified.

3. If we had a really pure insulator it could not be heated.

4. No fuel would burn in an atmosphere deprived of its oxygen.

5. First of all it should be emphasized that atoms and molecules are infinitely small, so small that it is really impossible for us to appreciate their masses.

6. The velocities are greatest in solids, which is what one would expect since their elasticities are normally higher than those of liquids or gases.

7. In order that a compound be in the large number of substances termed acids, it must have the following properties.

8. A gas in the normal state conducts electricity to a slight extent, however small the electric force may be.

9. Do not expose this compound to the air, lest it should decompose.

10. Unless the cathode is water cooled, it will overheat and emit gases.

11. It would be worthwhile investigating the substance mentioned, provided we could get it in sufficient quantity.

12. If the entire Earth were covered by ocean, high and low tides would follow one another at regular intervals in response to the rotation of the Earth and the revolution of the Moon.

13. If we were to stand motionless and hold a weight in our arms, we would grow tired, but we would not be performing work in physical sense of the term.

14. If the neutron and proton had the same mass, and if the Coulomb energy were completely negligible, there should be a definite correlation between the energy levels of isobars [‘aisəbɑ:].

## UNIT 4.

## VERBALS, GENERAL PRESENTATION

Before starting this theme let us revise the basics.

**Table 1**

The structure of the sentence in the English language.

0 - 4	1	2	3	4 - 0				
Обстоят-во	+	подлежащее	+	сказуемое	+	дополнение	+	обстоятельство
времени, условия, цели		«Кто?», «Что?»		«Что делает?»		прямое, кос- венное «Кого?», «Что?», «Кому?», «О чем?»		см. 0-4 «Где?», «Когда?» «При каком усло- вии?», «Почему?»
Yesterday		we		started		an experiment		(yesterday)
At 5 (o'clock)		they		will phone		him		at home (at 5)
-		We		live		-		in Moscow

**Table 2**

<b>Infinitive</b> (to do, to ask)	<b>Participle I</b> (doing, asking)	<b>Participle II</b> (done, asked)	<b>Gerund</b> (doing, asking)
<i>Образуются как глаголы</i>		<i>Функции в предложении как у существительного и прилагательного</i>	
1. Вид – Simple, Continuous, Perfect 2. Время – будущее, настоя- щее, прошедшее 3. Залог – Active Voice, Pas- sive Voice		1. Подлежащее 2. Часть сказуемого 3. Дополнение 4. Определение 5. обстоятельство	

### *Ex. 1*

Translate the sentences. When translating focus on how different parts of speech are used as the same parts of the sentence.

- Using this method may result in new possibilities. (Подлежащее.)

2. To use this technique means to put a lot of effort into the work. (Подлежащее.)
3. His constantly speaking about it annoyed me. (Подлежащее.)
4. We are to discuss this method in detail. (Часть сказуемого.)
5. They are talking about it right now. (Часть сказуемого.)
6. The study to be discussed was written by Dr.N. (Определение.)
7. The paper written by Dr.N. must be published soon. (Определение.)
8. The experiment being made now is important. (Определение.)
9. To be given this job you must have necessary qualifications. (Обстоятельство.)
10. Having applied for the job he decided to improve his computer skills. (Обстоятельство.)
11. Given these data we can go on with the experiment. (Обстоятельство.)
12. Without being given these data they were not able to... (Обстоятельство.)
13. She hates being interrupted. (Дополнение.)
14. I am glad to have been warned in advance. (Дополнение.)
15. Everybody would like to have a swim in such hot weather. (Дополнение.)

### ***Ex. 2***

Find verbals in the sentences and say what parts of the sentence they are. Translate the sentences.

1. To explain this simple fact is not easy.
2. New sources of cheap energy are to be found.
3. There are many problems to be solved.
4. They are likely to have completed the work.
5. The substance being investigated is new.
6. The heated object became red-hot.
7. Being invited too late he could not go to the conference.
8. Having made the measurements the experimenter processed the data.
9. Having been heated for several hours the substance began to melt.
10. My colleague being away, I had to take the decision myself.
11. The signal given, the rocket starts immediately.
12. Metals cannot be dissolved without being changed into new substances.
13. Dr. Brown's being absent was very strange.

**UNIT 5.*****INFINITIVE***

Study the tables and revise what you have learned from Unit 4.

**Table 1****Forms of the Infinitive**

Form	Active Voice	Passive Voice
Simple	to give	to be given
Continuous	to be giving	—
Perfect	to have given	to have been given

**Table 2****Parts of the sentence**

Члены предложения	Примеры
Подлежащее	1. To know everything about this event is absolutely necessary.
Часть сказуемого	2. He is to return very soon. 3. His intention is to complete the task.
Дополнение	4. She wants to know everything.
Определение	5. The problem to be discussed isn't easy.
Обстоятельство	6. To know everything about the event you will need to ask people a lot of questions.

**I.**

<b><i>Инфинитив в начале предложения</i></b>		
Место в предложении →	1. Подлежащее	0. Обстоятельство
Переводится →	Отвечает на вопросы «Что делать?», «Что?»	Вводится союзами «Чтобы»; «Для того чтобы»

1.1. To deal with this substance will be really important. (Иметь дело... будет...)

1.2. To give a true picture of the surrounding matter is the task of natural science. (Составить картину... является задачей...)

1.3. To understand this phenomenon is to understand the structure of atoms. (Понять или понимание... означает...)

1.4. To understand this phenomenon the laws of motion should be considered. (Чтобы понять..., нужно рассмотреть...)

1.5. To see the difference, look at the graph. (Чтобы понять..., посмотрите...)

1.6. To test the accuracy of the method they conducted a number of tests. (Чтобы проверить..., они провели...)

**NB! Запомните:**

in order (to) — для того чтобы

so as (to) — так чтобы, с тем чтобы

so ... as (to) — так (такой, настолько)..., что (чтобы)

1.7. In order to understand the procedure, consider the following analogy. (Чтобы ...)

1.8. It has become possible to modify this method so as to make it easier to use. (С тем, чтобы...)

1.9. This method was so complicated as to give only little result. (...настолько сложен, что давал...)

**II.**

<i>Часть сказуемого to be + inf.</i>		
Является →	Модальный глагол	Глагол-связка
Переводится →	Должен, нужно	Заключается в том, чтобы

2.1. This method is to show the dependence of temperature on solubility. (Должен показать...)

2.2. One way of obtaining hydrogen is to pass electric current through water. (Заключается в том, чтобы...)

2.3. New sources of cheap energy are to be found. (...должны быть найдены.)

2.4. Our goal is to prove this hypothesis. (... — это доказать...)



### III.

<i>Определение</i>	
Образуется →	Существительное + to inf.
Переводится →	Который нужно сделать; который предстоит сделать

3.1. The first scientist to discover this phenomenon was Lavoisier.  
(Ученый, который первым открыл...)

3.2. The problem to consider next is concerned with the ionization of gasses. (Проблема, которую должны рассмотреть...)

3.3. The terms to be insisted upon are as follows. (Условия, на которых надо настаивать...)

3.4. In vacuum molecules have large space in which to move. (... в котором они могут двигаться.)

#### **NB! Запомните:**

this is (these are...)+ сущ. + to inf. — *вот...*

there is (there are...)+ сущ. + to inf. — *существует, есть...*

3.5. There are many examples to illustrate the rule. (Существует много примеров, которые...)

3.6. This is the example to be mentioned first. (Вот пример, который...)

#### **Ex. 1**

Translate the sentences.

1. If fuels are to be burned efficiently it is necessary to mix air with the fuel.

2. The band theory we are about to discuss makes rather useful statements.

3. It is to be noted that at ordinary temperature this substance dissolves only slightly.

4. Little or no oxygen is to be found there.

5. It is to be emphasized that the electrical conductivity of beryllium is by no means as great as was formerly assumed.

6. You are to take into consideration that apart from kinetic theory there is little direct proof of the production of free oxygen atoms by photolysis of any oxygen.

7. Our task has been to determine the effect of X-rays on the substance under test.

8. The next step will be to produce a diagram of the system.

9. The object of these experiments was to find the connection between secondary electrons and the primary beta-rays from the radioactive substance.

10. Account is to be taken of the high boiling point of this liquid.

11. Use is to be made of the data obtained.

12. Unfortunately the thermal conductivity is very hard to determine.

13. The experimental results are few and not easy to interpret.

14. A weighed quantity of the material to be tested is placed in a capsule.

15. To explain the pressure of gases and their diffusion, it is generally supposed that all substances are made of very minute particles called molecules.

16. To find the mass of the electron was then of prime importance.

17. To be fully effective control must start with the production of raw materials.

18. To consider the special properties of matter in this state would be outside the scope of this book.

19. To define exactly what is meant by the total heat in a body is at present still not possible.

#### ***IV. For-phrase with the Infinitive***

##### **NB! Запомните:**

1. *“for” + сущ./местоим. в объект. падеже + инфинитив — сложноподчиненными предложениями с союзами «что», «чтобы», «для того чтобы»*

1.1. For a force to exist there must be two objects involved. (... , чтобы сила существовала...)

1.2. The temperature was too low for the substance to decompose. (... , для того чтобы вещество...)

1.3. The tendency was for the gas to become ionized. (Тенденция заключалась в том, что газ.../ Существовала тенденция, что...)

1.4. The tendency for the substance to become ionized at high temperatures was investigated. (... тенденция, что вещество...)

1.5. It is possible for the reaction to occur. (Возможно, что реакция...)

2. Эмфатическая конструкция:

*to be + "for + сущ./мест. + inf."* — именно кто-то должен сделать

2.1. It is for him to decide. (Именно он должен...)

2.2. It is for the assistant to prepare everything for the experiment. (Именно ассистент должен...)

3. *Определяемое существительное + "for-phrase"* переводится сложноподчиненными предложениями с союзами «который», «которые»...

3.1. The only conclusion for him to make was the following. (...вывод, к которому он пришел...)

3.2. This is the book for you to read. (... , которую ты должен...)

### ***Ex. 2***

Translate the sentences.

1. The tendency is for the molecule to become agitated.

2. For the observation to be of service two facts must be known.

3. In order for two molecules to react they must be in contact.

4. The motion took place long enough for the bodies to become heated.

5. Under what conditions will the reaction proceed sufficiently rapidly for the method to be practicable?

6. Here is one more important point for the speaker to explain.

7. It is not unusual for the phosphatic uranium minerals to be used as a commercial source for uranium.

8. Rusting represents the tendency for the iron to revert to the unstable condition.

9. Two conditions must be met for this process to occur.

10. The time taken for equilibrium conditions to be set is small.

11. A slow molecule is a nearly stationary target for other molecules to hit.

12. For a reaction to take place, an A molecule must first meet a B molecule.

13. The accuracy of the lunar and solar theories is not sufficient for them to be significant.

14. The tendency for a substance to come to a metastable state must be taken into account.

15. It is possible for the substance to be compressed.

**V. Complex Subject - Complex Object**

*Образуются: именная часть + инфинитив*

Сравните: He is known to come soon. — Complex Subject.  
Сложное подлежащее (именительный падеж) — “he... to come”.

We know him to come soon. — Complex Object.  
Сложное дополнение (объектный падеж) — “him to come”.

Повторите *Table 2, Unit 4.*

<b>COMPLEX SUBJECT</b>					
<i>Существит. /местоимен.</i>	+	<i>сказуемое</i>	+	<i>инфинитив</i>	
He		Сказуемое может быть выражено:		To know (будущ.,наст.)	
		I.	II.		III.
They		<u>Active Voice</u>	<u>Passive voice</u>		To be working (наст.)  To have done (прошедш.)
		seem	be likely	be said	
The method		appear	be unlikely	be supposed	
		turn out	be sure	be expected	
etc		prove	be certain	be proved	
		happen		be believed	

**NB! Запомните:**

- prove – оказывается
- be proved – доказано
- be likely – вероятно
- be unlikely – маловероятно

*Перевод Complex Subject начинайте со сказуемого, которое в русском переводе станет безличным. Сложное подлежащее превращается в придаточное предложение с союзом “что”.*

Before going on, revise *Unit 5*.

- a. They seem to have applied strong ionization. ( По-видимому, они применили...)
- b. The result was expected to agree with theoretical predictions. (Ожидалось, что результат будет соответствовать...)
- c. Water was considered to be an element. (Считалось, что вода является...)
- d. This method is unlikely to have been used. (Маловероятно, что метод использовался.)

**Ex. 3**

Put the words in the right order to make meaningful sentences.

- 1) is/ to/ more/ black/ absorb/ known/ intensively/ light/ colour/ rays//
- 2) have/ interesting/ the/ is/ collected/ said/ expedition/ material/ to/ very//
- 3) up/ much/ help/ save/ believed/ to/ to/ metal/ invention/ this/ is//
- 4) to/ a/ known/ lecturer/ is/ have/ wonderful/ been/ Zhukovsky//
- 5) 19<sup>th</sup> century/ Mars/ thought/ be/ to/ the/ the/ seas/ dark/ in/ areas/ on/ were//
- 6) is/ to/ me/ he/ notice/ unlikely//
- 7) to/ hard/ to/ she/ be/ seems/work/ used//
- 8) supposed/ ski/ year/ people/ there/ round/ are/ to/ all//

#### **Ex. 4**

Translate the sentences.

1. Heat was for a long time considered to be an invisible fluid.
2. In ancient times light was thought to be a property of the eye.
3. This state of motion gives a representation of what is supposed to be the condition of matter in its gaseous state.
4. This substance is very unlikely to have possessed valuable properties.
5. There seems to be some confusion of terms in this paper.
6. This device is likely to give the results required.
7. The technique proves to be too complicated to be really useful.

#### **NB! Запомните:**

*Сложное подлежащее с отрицанием*

Активное сказуемое – “не“ в переводе относится к инфинитиву, пассивное сказуемое – “не“ в переводе относится к сказуемому.

e.g.: 1. He does not appear to know them. (Кажется, он их не знает.)

2. This substance was not observed to exhibit radiation. (Не наблюдалось, что это вещество обладает...)

*Сравните:* This substance was observed not to exhibit radiation. (Наблюдалось, что это вещество не обладает...)

#### **NB! Запомните:**

Именная часть + Participles I or II// likely/unlikely... + to V —  
*переводится:*

подлежащее + «который, вероятно», «как полагают» + сказуемое

e.g.

1. The book assumed to be published soon has not even been written yet. (Книга, которая, как предполагалось, будет опубликована...)

2. Here is the device likely to give the results required. (Вот прибор, который, вероятно, даст...)

3. He used a substance appearing to induce X-rays. (... вещество, которое, видимо, испускало...)

### Ex. 5

Translate the sentences.

1. This substance may easily be demonstrated to be a compound.
2. The bombardment of beryllium by alpha-particles from polonium gives rise to a very energetic type of radiation. This radiation was first thought to consist of gamma-rays, but the energy relationships were found to disagree with this assumption.
3. Lansmair's attempt to account for spectral series without the assumption of moving electrons cannot be said to possess any real value.
4. This method does not seem to offer any advantages over that discussed above.
5. A substance known to possess these properties is called an acid.
6. Heat was proved to be a form of energy.
7. Many substances are known to dissolve in hot water.
8. The substance reported to dissolve in hot water was thoroughly tested.
9. The eclipse of the sun was predicted to occur in 1460.
10. The eclipse of the sun predicted to occur in 1460 took place at exact moment foretold.
11. The postulates of the theory are of fundamental importance, and are likely to form the nucleus of future theories of the structure of molecules.

### COMPLEX OBJECT

Before starting this theme, revise *Unit 5*.

COMPLEX OBJECT		
<i>Подлежащее</i>	<i>+</i> <i>сказуемое</i>	<i>+</i> <i>сложное дополнение +...</i>
He They The students	<b>NB!</b> Если сказуемое выражено глаголами e.g. <b>know, find, consider, want</b> , etc	<b>NB!</b> То сложное дополнение имеет вид e.g. <b>him/ her/ them + to come/ to work</b>
The book etc	<b>NB!</b> Если сказуемое выражено глаголами e.g. <b>see, hear, observe, feel, watch</b> , etc	<b>NB!</b> То сложное дополнение имеет вид e.g. <b>him/ you/ me + come/ go/ work</b>

**NB!** 1. Переводите такие предложения сложноподчиненным предложением с союзом «что».

2. Сказуемое выражено глаголом физического восприятия — инфинитив без «to».

**Запомните:**

Let's do= Let us do — Давайте мы (сделаем)...

Let me do — Давайте я (сделаю)

Let him/ her/ them...do — Пусть он, она, они...  
(сделают...)

Не употребляется в Passive Voice.

**Запомните :**

to make smb do smth

to cause smb to do smth — Заставить кого-либо  
сделать что-либо.

**But!** To be made to do smth (Passive Voice).

**Ex. 6**

Translate the sentences into English.

1. Я знаю, что его коллеги (colleagues) сейчас проводят эксперимент.

2. Он думает, что они скоро закончат этот опыт.

3. Они полагали, что вещество уже растворилось (dissolve).

4. Пусть они подготовят (set up) эксперимент.

5. Никто не заставлял (1. make/ 2. cause) его пользоваться именно этой методикой.

6. Давайте я найду это слово (look up) в словаре.

7. Я видел, как он разговаривал с профессором.

**Ex. 7**

Translate the sentences into Russian.

1. The experiments have proved the pressure of a gas at fixed temperatures to depend on its concentration.

2. One may safely expect this prediction to be quite reliable.



3. Let us take the force to equal 17 dynes.
4. They found radon to be 3 times as heavy as hydrogen.
5. Let them take the volume of this body to equal 0.
6. They expected the acceleration to have been changed but this was not the case.
7. It is customary to consider the electric current to flow in the opposite direction to the motion of the electrons which constitute it.
8. This substance was supposed to be an element.

### *Revise Unit 5.*

Translate the sentences.

1. The radius of our orbit is believed to be increasing very slowly.
2. The copper to be refined is cast into large plates.
3. This property allows the alpha particle to be detected.
4. The source is so weak as to add comparatively few additional counts above the background.
5. There appear to be two distinct effects in this case.
6. Electrons can be made to travel at very high speeds.
7. The idea of nuclear charge and atomic number is now realized to be most important.
8. A certain period of time must be allowed for the oil drops to be removed by the electric field.
9. There appears to be direct evidence of the existence of negative electrons in matter.
10. The best agreement is to be found in the case of carbonic acid.
11. In this discussion the nucleus will be taken to be at rest.
12. Ordinary objects are not likely to move with a velocity approaching the velocity of light.
13. The lithium nucleus is too small for so many collisions to occur.
14. Secondary radiation may be expected to rise when the primary radiations are observed.
15. Light is to be considered as some kind of wave motion of electromagnetic origin.
16. Alpha-rays are shown to be identical, no matter from what radioactive element they are emitted.
17. Pitchblende was shown by X-ray and emission examination to have been a mixed salt.
18. It will be necessary for the observer to remain in the dark at least ten or fifteen minutes to accustom his eyes to the darkness.
19. In liquids and solids the movements of molecules must be supposed to be more restricted.

20. Samples of two ores from a region known to be geologically very old have ages close to 2000 million years.

21. To test for a soluble iodide one adds to a test tube containing the solution to be tested one cubic centimeter of carbon disulphate and a few cubic centimeters of chlorine water and shakes the mixture vigorously.

22. To maintain a constant temperature in a small or large container was for years and still is a very important technical problem because most precise physical and chemical experiments require the temperature of the object to be constant at the moment when the readings or any other kind of observation are made.

23. The speed of the particles is a bit too swift for us to study in detail.

24. For the growth to continue steps must be formed gradually at ordinary temperature.

25. The theorists were not sure whether what the observers considered to be the brightest stars in a galaxy were actually stars.

26. The discussion of too many details and special cases does not seem to be desirable, since it is likely to obscure the fundamentally important points.

27. As information accumulated, it became clear that the work was unlikely to yield necessary data.

## Unit 6.

## *PARTICIPLES*

Before starting *Unit 6*, revise *Unit 4*, *Tables 1* and *2*.

**Table 1**

### **Forms of the Participles**

<b>Participle I = Present Participle = = Причастие настоящего времени = Ving</b>		
<i>Forms</i>	<i>Active Voice</i>	<i>Passive Voice</i>
Simple	doing, reading, looking	being done, being read, being looked
Perfect	having done, hav- ing read, having looked	having been done, having been read, having been looked

<b>Participle II = Past Participle = = Причастие прошедшего времени = V<sub>3</sub></b>	
<i>Form</i>	<i>Passive Voice</i>
Simple	done, read, looked, watched, etc

**Table 2**

**Parts of the sentence**

Члены предложения	Примеры
1. Часть сказуемого	1.1. They are <u>talking</u> now. (Present Continuous, Part. I.) 1.2. They have <u>finished</u> their talk. (Present Perfect, Part. II.) 1.3. The article was <u>published</u> last year. (Past Simple Passive, Part. II.)
2. Определение	2.1. The work <u>performed</u> by this scientist is interesting. (Part. II.) 2.2. The room was lit by a <u>burning</u> candle. (Part. I, present, active.) 2.3. The technique <u>being used</u> now was developed by his team. (Part. I, present, passive.)
3. Обстоятельство	3.1. <u>Being invited</u> too late he could not come. (Part. I, present, passive.) 3.2. <u>Having been heated</u> the substance began to melt. (Part. I, perfect, passive.) 3.3. <u>Given</u> the data, we can start work. (Part. II, simple, passive.)

## 2. Определение

может стоять либо до, либо после определяемого слова

1. Причастие + сущ.	2. Сущ. + причастие
e.g. The <u>heated object</u> became red-hot.	e.g. Hydrogen is the lightest <u>element known</u> .

1.1. The kid is playing. — The playing kid (present, active). — Играющий ребенок.

1.2. The sun is shining. — The shining sun (present, active). — Сияющее солнце.

1.3. The paper was written. — The written paper (past, passive). — Написанная статья.

1.4. The test was discussed. — The discussed test (past, passive). — Обсужденный тест.

*Повторите значения глагола “to follow”, Unit 1.*

### *Ex. 1*

Turn the words given in brackets into participles and insert them into the English sentences. Use preposition “by” where necessary. Translate the sentences.

1. The substance («на которое оказывает влияние» – to affect) a magnetic field was a metal.

2. The substance («которое оказывает влияние на» – to affect) a magnetic field was metallic.

3. The phenomenon («которое влияет на» – to influence) the rate of the reaction was thoroughly investigated.

4. Cooling («вслед за» – to follow) heating gave good results.

5. Cooling («за которым последовало» – to follow) heating gave good results.

6. The procedure («которой пользовался» – to follow) this investigator was proposed by Dr. Smith.

7. The scientist («пользовавшийся» – to follow) this procedure investigated some phenomena of radioactivity.

## **Ex. 2**

Translate the sentences.

1. The paper on heat conduction of gases followed by the report on diffusion was presented by Dr. Lewes.
2. Still other arguments have already been produced in studies following quite a different line.
3. Here we shall outline the basic approach followed in each of these formulations.
4. The period following Fresnel's death was characterized by the gradual triumph of his ideas.
5. Galileo, following Copernicus, believed the Earth to move round the Sun and rotate round its axis.
6. Young, followed by Fresnel, showed that under these conditions light does in fact present phenomena of interference.
7. Following these early discoveries, a great many alloys have been discovered.

**NB! Существительное + Part. II involved, concerned** —  
«данный; о котором идет речь; рассматриваемый; связанный с...»

*e.g.*

1. The properties of the substances involved are well understood. (Свойства данных веществ...)
2. The phenomenon is rather complicated and the processes involved are not clear. (... связанные с этим процессы...)
3. None of the authors concerned describes this process. (Никто из авторов, о которых идет речь...)

**NB!**

**Подлежащее + Ved + Ved**  
(подлежащее + Part. II + сказуемое (Simple Past))

*e.g.*

1. The substance obtained contained some impurities. (Полученное вещество содержало...)
2. The work performed showed good results. (Проделанная работа показала...)
3. The engineers invited graduated from MEPHI. (Приглашенные инженеры окончили...)

**NB! Perfect Participle I не может быть определением —**  
используется придаточное предложение.

**Ex. 3**

Join the sentences using participles where possible.

1. The texts are corrected. They are on the table.
2. Some questions are worth careful consideration. These questions were touched upon in the report.
3. The woman opened the door for me. She looked very familiar.
4. The man was waiting for you. He has just gone.

<b>II. Причастие в начале предложения</b>		
1. <u>Обстоятельство</u>	2. <u>Инверсия</u> (Continuous или Passive Voice)	3. <u>Вводный член</u> <u>предложения</u>
Отвечает на вопросы «когда?», «почему?», «как?»	Эмфатическая конструкция.	Перевод начинайте с союза «если»
e.g. Having finished the work they left for home.	e.g. Driving the car was her husband!	e.g. Strictly speaking, the results were unreliable.

1. Обстоятельство

- 2.1. Reading this book I found out many interesting things. (Читая...)
- 2.2. Considering from this point, he could go to the conference. (При рассмотрении с этой точки зрения...)
- 2.3. Having made the measurements they then processed the data. (Проведя измерения...)
- 2.4. Inducing high radiation the substance should be used with care. (Поскольку вещество обладает...)
- 2.5. Having thus finished his talk the speaker waited for comments. (Закончив таким образом...)

**Ex. 4**

Join the sentences using participles.

1. They arrived two days before the opening of the conference. This is why they had enough time to go sightseeing.
2. I did not do the work in time. I had to apologize to them.
3. She was absent. I did not know why and decided to ring her up.
4. I thought that he could be interested in this subject. That is why I advised him to read the book.

**NB! Предложение начинается с**

- a) **given** — если дано, если имеется, если;
- b) **granted** — если допустить;
- c) **seen** — если рассматривать;
- d) **stated** — если сформулировать.

**Ex. 5**

Translate the sentences.

1. Given its angular diameter, the linear diameter of the Sun...
2. Given the weight and the specific gravity of a body, you can calculate its volume.
3. Seen in this context, the ranges of applicability and reliability of the method may be assessed.
4. Stated in a simple form the hypothesis runs as follows.
5. In our immediate vicinity are other worlds in which life, as we know it, would have the greatest difficulty of survival, even granted it might at one time have originated there.

**NB! Запомните:**

- whenever – всякий раз, когда
- when doing – делая что-либо
- when done – когда что-либо сделано
- unless done – если не сделать
- unless otherwise stated/ indicated... – за исключением того случая, который оговорен особо
- though – хотя
- even though – даже если
- when exposed to light/ radiation... – под действием света/ радиации
- as opposed/ as contrasted – в противоположность

### **Ex. 6**

Translate the sentences.

1. When calculating the weight of a body we have to multiply its specific gravity by its volume.
2. When falling the more massive bodies have more inertia to overcome.
3. If presented by arrows the forces can be easily computed.
4. Once started the plate current is no longer affected by the grid voltage.
5. Metals do not melt until heated to a definite temperature.
6. Except where otherwise indicated, we take an ideal gas.
7. Unless otherwise specified, the condition is as follows.
8. For the voltage considered, the experiments support the conclusions and model of Dowson and Winn as opposed to the model of Wright.

### 2. Инверсия

(Participles I, II являются частью сказуемого)

- (e.g.) 1. Sitting on the sofa was a little girl. (На диване сидела... — Present Cont.)
2. Attached to the upper end is a disc. (К верхнему концу прикреплен диск.— Passive Voice.)

### **Ex. 7**

Translate the sentences.

1. Shown near the bottom of the drawing are two gears.
2. Hanging from this stick are several little pendulums.
3. Inserted in the circuit thus created is an instrument called a galvanometer.
4. Included in this table are currents calculated on the supposition that the entire effect is due to ionization by collision of negative ions only.
5. Allied to the conception of the atom is the idea of atomic weights.



### 3. Причастный оборот

в функции вводного члена предложения всегда *выделяется запятой*.

*e.g.*

1. Turning to the main laws of mechanics, the first law of Newton states that... (Если обратиться к..., то следует сказать, что...)

2. Roughly speaking, collisions hardly alter electrons' energies. (Грубо говоря,...)

#### **NB! Запомните:**

as emphasized above – как подчеркивалось выше

as already mentioned – как уже упоминалось

as pointed out previously – как указывалось ранее

as stated earlier – как установлено ранее

roughly speaking – грубо говоря

generally speaking – вообще говоря

strictly speaking – строго говоря

broadly considered – вообще, в широком смысле

put another way

putting it another way

иначе говоря, другими словами

#### **Ex. 8**

Translate the sentences.

1. As mentioned previously sodium tarnishes (тускнеет) when exposed to air.

2. As emphasized above these elements are strongly radioactive.

3. As pointed out in the previous chapter astronomers are by no means of one mind as to this phenomenon.

4. The quantum of energy is largest, generally speaking, when it refers to light particles.

5. Turning to propagation, the most notable difference between light and radiowaves so far utilized is the ability of radiowaves to penetrate clouds.

### Ex. 9

Translate the sentences. Say what parts of the sentence these participles are.

1. Turning now to X-ray spectra, it has been already noticed that the lines of these series cannot be excited separately.

2. Surrounding this nucleus are electrons, the total number of which depends upon the atom considered.

3. Included in the first part will be experiments related to mixed crystals.

4. Applied to gases, this law may for the present purpose be stated in the simple form.

5. Given this value the velocity of a body can easily be computed.

6. Following these displacement laws, the location of any radioactive element in the Periodic Table can be found.

7. Passing next to the case of helium, it has been observed that the nucleus contains both protons and electrons.

### *ABSOLUTE PARTICIPLE CONSTRUCTION (НЕЗАВИСИМАЯ ПРИЧАСТНАЯ КОНСТРУКЦИЯ)*

**Table 1**

<i>Главное предложение</i> + <i>независимая причастная конструкция</i> переводится:	
Главное предложение +	союзы: <b>а, и, причем</b> + придаточное предложение

**Table 2**

<i>Независимая причастная конструкция</i> + <i>главное предложение</i> переводится:	
Союзы: <b>так как, если, после того как, когда</b> +	главное предложение

## **NB! Запомните:**

1. Существительное/ местоимение независимой причастной конструкции переводится подлежащим придаточного предложения, причастие независимой причастной конструкции переводится сказуемым придаточного предложения.
2. Независимая причастная конструкция всегда отделяется запятыми.
3. Эта конструкция может начинаться с предлога with — переводится: «если», «так как», «а».

*e.g.*

1. My colleague being away, I had to take the decision myself. (Так как мой коллега отсутствовал,...)
2. Weather permitting, the astronomer will proceed with his observation. (Если позволит погода,...)
3. The signal given, the rocket starts immediately. (Когда дается/ как только дается сигнал,...)
4. The sky having cleared, the astronomer proceeded with his observation. (Так как/после того как небо прояснилось,...)
5. We could not enter, there being many people in the conference hall. (... , так как в зале было много народу.)
6. The sodium atom has eleven electrons, the eleventh one occupying a position outside of the the second shell. (... , причем одиннадцатый занимает положение...)
7. We continued our work, with our laboratory assistants helping us. (... , а наши лаборанты нам помогали.)
8. Other conditions being equal, the acceleration remains constant. (При прочих...)

## **Ex. 10**

Join the sentences using Absolute Participle Construction.

1. Silver is very expensive. We only rarely use it as a conductor.
2. Radioactivity was discovered. We made great progress in atomic physics.
3. Hydrogen consists of molecules. Each molecule is made up of 2 hydrogen atoms.

4. The speed of light is extremely great. We cannot measure it by ordinary methods.

5. Water is denser than air. Rays are refracted towards the perpendicular.

6. The electricity is carried exclusively by the electrons. The atomic nuclei remain stationary.

7. It is frequently said that the atom is a sort of miniature solar system. Its electrons orbit about the nucleus as planets orbit around the Sun. (Use “with”.)

### ***Ex. 11***

Translate the sentences.

1. The square of any number being positive, the square root of a negative number is imaginary.

2. Acids react with oxides of all metals, a salt and water being formed.

3. Other liquids being too light, a barometer uses mercury.

4. Other things being equal, the efficiency is less in irreversible cyclic processes.

5. As the wavelength of such waves decreases they become more penetrating, gamma-rays being able to travel through as much as one foot in iron.

6. The atoms break up in a perfectly ordered fashion, independent of imposed conditions so far as is known, each atom yielding a new atom, with the emission of the energy difference between the new state and the old.

7. The radioactive sulphur may be added to sulphite and then removed, the resulting sulphite containing little or no radioactive sulphur.

8. Other things being equal, we should expect lines from elements in relatively large amounts to be the more prominent.

9. There being no atmosphere, the lunar surface is exposed to direct sunlight.

10. The Moon is mainly responsible for the tides on the Earth, with the Sun also assisting simply by its direct attraction of the water.

11. The electric field between the plates being altered, particles of a different velocity may be selected for study.

## Revise *Unit 6*.

Translate the sentences.

1. The acceleration of a body is proportional to the force causing it.
2. Having obtained the necessary compound we can now proceed with our experiment.
3. Rutherford's research work followed by many experiments of other scientists made a great contribution into physics.
4. This relative density of a gas is equal to the molecular weight of the gas (usually hydrogen) being used as the standard.
5. The pressure just calculated is the surface pressure.
6. The resistance drops when exposed to light.
7. Unless otherwise stated we shall consider only solutions in liquids.
8. The positron or positive electron was discovered in 1932 by Anderson while working with cosmic rays.
9. While isolating and separating radium, Mme Curie found other radioactive elements.
10. A base is coated with a layer of iodine followed by a layer of copper.
11. Every body continues in its state of rest, or motion in a straight line with constant velocity, unless acted upon by some external force.
12. The application of these corrections, followed by rounding off, gives the final value in Table II.
13. The angle of incidence of the electron beam on the crystal being fixed, the accelerating potential was varied gradually.
14. As stated before, the greater the binding energy, the more stable the nucleus.
15. Only the uranium series is shown, it being typical of the rest.
16. With further heating the waves are still shorter and colour advances along the spectrum, with yellow, then blue waves, being emitted.
17. There being a close packing of molecules in a liquid, the molecular encounters occur much more frequently than in a gas under the same conditions.
18. It is a matter of common observation that light is refracted when passing from one medium into another.
19. Figure 1 represents a filament inside a metal cylinder, the combination enclosed in a glass bulb.
20. The part played by the electron is that of the elementary corpuscle of negative electricity.

21. The first step towards intimate understanding of a chemical reaction is to determine the formulae of the compounds involved.

22. From the northern station Venus is seen projected upon the Sun's surface.

23. There exist various kinds of light, each corresponding to some definite "colour".

24. Going around the Earth once every 29 days is our Moon at a distance of 24,000 miles.

25. Associated with the existence of positive and negative ions is a strong absorption coefficient in the infrared.

26. Concealed in the foregoing figures are some very important facts, which I shall point out.

27. Taken together, these effects, occurring as they do in rapid succession, provide a simple interpretation of the production of showers.

28. Passing from one chemical element to the next, one would find the nuclear charge increasing by one, the number of electrons revolving also growing by one.

## UNIT 7.

## GERUND

### **Gerund имеет:**

1. *Формы как у Present Participle: Ving.*

2. *Функции в предложении, как у существительного: подлежащее, дополнение.*

3. *Может быть определением.*

Gerund употребляется	Например
1. С притяжательным падежом	1. <u>His singing</u> was nice. My <u>brother's playing</u> the guitar annoyed me.
2. С предлогами	2. She is fond <u>of skating</u> . We cannot go on <u>without checking</u> the results. He insisted <u>on our leaving</u> Moscow.

*Before starting this part of Unit 7, revise Unit 4.*

## 1. Подлежащее

**NB! Запомните!** *Gerund* стоит в начале предложения — переводится *существительным*  
(сравните с употреблением причастия в начале предложения, Unit 6).

*e.g.*

1.1. Falling is a case of motion at constant acceleration. (Падение...)

1.2. Measuring resistance is necessary in many experiments.  
(Измерение...)

1.3. Heating copper wire increases its resistance. (Нагревание...)

## 2. Прямое дополнение

**NB! Запомните!** *Gerund* употребляется после:

to avoid – избегать

to prevent – предотвращать

to resist – сопротивляться

to withstand – противостоять

smb. cannot help – не может не

it is worth

it is worth-while

it is no good

it is no use

стоит (что-либо сделать)

не стоит, бесполезно, нет смысла

### ***Ex. 1***

Translate the sentences.

1. There is no more point worth mentioning.
2. It is no use searching for another approach.
3. It is no good arguing about the issue.
4. We cannot help acknowledging the importance of this statement.
5. Would you mind answering one more question.
6. It seems to me the case is not worth mentioning.
7. Avoid mixing these two substances.
8. I can't help regretting it.
9. A phosphorescent material is able to continue glowing in the dark.
10. Hardness is the ability to withstand being dented or stretched.

11. The ability of a solid to resist being altered in shape is termed rigidity.

### 3. Предложное дополнение

**NB! Запомните!** Gerund употребляется после:

- to account for – объяснять
- to aim at – ставить целью
- to be capable of – быть способным
- to credit smb with – приписывать (кому-либо что-либо)
- to depend on/ upon – зависеть от
- to differ in – различаться (по каким-либо свойствам)
- to insist on/upon – настаивать на чем-либо
- to be interested in – интересоваться чем-либо
- to keep from
- to prevent from | мешать, препятствовать
- to object to – возражать против чего-либо
- to rely on/ upon – полагаться на что-либо
- to be responsible for – являться причиной чего-либо
- to result from – происходить из чего-либо
- to result in – приводить к чему-либо
- to succeed in – удаваться, добиваться
- to think of – представлять себе, думать о
- to give up – заканчивать
- to go on – продолжать

#### *Ex. 2*

Translate the sentences.

1. The use of catalysts accounts for accelerating reactions.
2. I think of trying another approach.
3. The droplets are capable of being photographed.
4. He succeeded in obtaining reliable results.
5. The book aims at acquainting the reader with modern achievements in astrophysics.
6. Calcium and sodium are alike in being very soft.
7. Selenium and tellurium resemble sulphur in presenting a number of allotropic (аллотропический) forms.



8. Archimedes is credited with applying huge lenses.
9. The motor went on running.
10. He had to give up experimenting.

#### 4. Обстоятельство

##### **NB! Запомните!**

Gerund употребляется со следующими *предлогами*:

in doing smth – при, во время, в процессе

on/ upon doing smth – после завершения

by doing smth – путем, при помощи, посредством

through doing smth – путем, из-за, благодаря

without doing smth – без чего-либо, не делая чего-либо

##### **Ex. 3**

Translate the sentences.

1. A metal in reacting is often oxidized.
2. In making observations extreme care to avoid errors is necessary.
3. The expansive force of water in freezing is enormous.
4. On standing for some weeks the uranium solution gradually regains its initial activity.
5. Upon being heated to a high temperature many metallic compounds are decomposed.
6. Phosphine (фосфин) is prepared by heating white phosphorus in a concentrated solution of sodium hydroxide.
7. Phosphorus burns in chlorine without being lighted and gives rise to a compound called phosphorus chloride.
8. Most precipitates may be ignited without drying if proper precautions are taken.
9. Metals cannot be dissolved without being changed into new substances.

## Определение

### NB! Запомните!

Gerund употребляется после *существительных*:

ability of – способность  
advantage of – преимущество  
chance of – возможность  
merit of – достоинство  
necessity of – необходимость  
possibility of – возможность  
reason for – причина  
way of – способ

### Ex. 4

Translate the sentences.

1. The device has the merit of being suitable for many purposes.
2. There is no necessity of making any corrections.
3. Our purpose is to calculate the chance of the electron passing over this distance.
4. The independent particle model has the advantage of possessing a high degree of physical visuality.
5. The observed intensity of the radiation thus emitted depends on the probability of there being an electron in the upper level of the transition.
6. There is some reason for questioning this assumption.
7. We have no way of selecting particular enzymes that are likely to reveal effects of gene dosage.

## 5. Gerund после выражений с предлогами

### NB! Запомните!

Такие выражения + Gerund переводятся *придаточным предложением с союзом «что»*.

on account of – из-за  
apart from |  
aside from | помимо, кроме  
in addition to – вдобавок  
because of – из-за

in spite of		несмотря на	
despite			
due to		следствие, благодаря	
except (for)			за исключением
instead of			вместо
owing to		благодаря	
thanks to			
with the object to		с целью	
with the view to			
save			кроме

**Ex. 5**

Translate the sentences.

1. The molecules of a polar substance because of their being reactive combine with one another.
2. Combustion may be incomplete owing to insufficient oxygen being present.
3. Thomson investigated the possibility of these cathode rays being charged particles.
4. Mme Curie's having discovered radium enabled her to isolate other radioactive elements.
5. The inability of phosphorus atoms, because of their large radius, to establish triple bonds among themselves resulted in the phosphorus molecule having a very different structure from the nitrogen molecule.
6. Besides being important for industry oxygen is also important for medicine.
7. In addition to depending upon the acceleration, force also depends upon the mass of the object.
8. Gamma-rays are not affected by magnetic or electric fields and are identical with X-rays, except in being more penetrating, thus being in fact ordinary light pulses of the shortest wavelength.
9. Oxygen is an active element of the atmosphere, and in addition to being essential for combustion, the rusting of metals and the decay of organic matter.

### **Ex. 6**

Put the words in the right order to make meaningful sentences. The words are given below. Translate them into Russian.

1. The/ from/ the/ explosion/ being/ substance/ resulted/ volatile.
2. Are/ high/ these/ in/ alike/ melting/ substances/ points/ having.
3. Faraday/ in / education/ spite/ made/ not/ any/ having/of/ university/ great/ discoveries/ his.
4. This/ the/ depends/ being/ atomic/ on/ these/ weights/ of/ substances/ equal.
5. There/ probability/ is/ on/ atmosphere/ little/ of/ that/ being/ planet.
6. Electric/ of/ low/ in/ in/ conductivity/ resulted/ rubber/ being/ cables/ its/ used.
7. Man/ in/ in/ has/ recent/ controlling/ changes/ years/ succeeded/ chemical.
8. Help/ joining/ he/ the/ could/ not / discussion.
9. Would/ to/ showing/ you/ slides/ mind/ some/ my/ you.
10. Author/ applied/ the/ a/ reports/ method/ having/ new.

### **Ex. 7**

Translate the sentences.

1. So far only the quantum theory has succeeded in giving a satisfactory explanation.
2. The alkali metals are remarkable in being so light that they float.
3. We account for the incompleteness of a reaction by its being reversible.
4. Einstein's being awarded the Nobel prize in physics soon became widely known.
5. Iron is covered with a thin layer of tin to prevent it from rusting, for tin does not rust on exposure to air.
6. It is perhaps worth-while considering somewhat more carefully the attraction of a magnet to a piece of iron.
7. To a large extent the skilled analyst's productivity may be attributed to his having acquired, through many repetitions, the necessary technique.

8. In order to calculate the motion of an electron, we must investigate the accompanying wave motion instead of using classical mechanics.

9. Most actual crystals are imperfect, owing to being grown under conditions in which solid materials are somewhat impeded in reaching and being deposited on certain faces.

10. The regular array of atoms in the lattice results in there being certain sets of parallel and equally spaced planes in the crystal which will contain large numbers of atoms.

11. The explosion resulted from the substance being volatile.

12. They objected to the data being published before all the experiments were completed.

13. This inconsistency depends upon real gases being less compressible.

14. In solving problems it is necessary to distinguish between fact and hypothesis.

### *Keys*

#### *Ex. 6*

1. The explosion resulted from the substance being volatile.

2. These substances are alike in having high melting points.

3. In spite of not having any university education, Faraday made his great discoveries.

4. This depends on the atomic weights of these substances being equal.

5. There is little probability of atmosphere being on that planet.

6. Low electric conductivity of rubber resulted in its being used in cables.

7. In recent years man has succeeded in controlling chemical changes.

8. He could not help joining the discussion.

9. Would you mind my showing some slides to you?

10. The author reports having applied a new method.

*Revise Units 6 and 7.*

Translate the sentences.

1. Introducing an “ideal” substance is a favourite device in theory, but it is sometimes dangerous.

2. Using the terms just defined, the above examples of functional relations can be explained as follows.

3. Studying experiments with ice one can show that pressure causes ice to melt.

4. Bombarding atoms often results in unstable atoms that sometimes emit positrons and sometimes electrons.

5. Substituting this value in our equation, we get the following formula.

6. Being appointed Head of the Department, Dr. Blume resumed his work on atomic collisions.

7. His colleagues living in London, Lous wrote to them about his discovery.

8. Some of the problems not being solved, our group had difficulties in proceeding with the work.

9. Reaction rate under given conditions is proportional to the concentration of the substance being transformed.

10. The rapid rates at which gases diffuse constitute sufficient evidence to deny the possibility of their structure.

11. An electron shown in the sketch as being in the outer ring of four has a fairly large probability of being just outside the nucleus and even closer to it than the two electrons of the inner ring.

## UNIT 8.

## *EMPHATIC CONSTRUCTIONS*

**I.** Вспомогательный глагол *do (does/ did)* в утвердительных и повелительных предложениях усиливает смысловой глагол — переводится: «действительно», «на самом деле».

*e.g.*

1. The above law does hold. (... на самом деле справедлив.)

2. Let us now consider what happens when forces do act on it.  
(... когда силы действительно действуют.)

### **Ex. 1**

Translate the sentences.

1. This field does not affect the forward motion of the electrons but does act upon the transverse motion.
2. Copper does not combine with oxygen when cold, but it does do so slowly when heated.
3. Most authorities agree that catalysts do in some manner combine with the substance or substances upon which their catalytic influence is exerted.
4. These molecules are too small to be seen, even with the microscope, but strong experimental evidence seems to show that they do exist.
5. The formation of ozone during the electrolysis of water does not change the weight of the gas collected at the positive pole but it does decrease the volume.
6. Though some substances (*e.g.* sand) seem to be very nearly insoluble, water does dissolve most things to some extent.

**II. Inversion (обратный порядок слов) усиливает второстепенные члены предложения.**

**NB! Запомните:** not only ... but (also) – не только ..., но и...

hardly ... when		едва ..., как...
scarcely ... when		
no sooner ... than		– как только
neither/ nor		– и не, а также не
so		– а также, и
nowhere		– нигде

### **Ex. 2**

Translate the sentences.

1. Only upon the adsorption of larger amounts was the sensitivity again lowered.
2. No sooner has the current started running in one direction than back it comes again.

3. Perhaps never was the making of an important invention shared by so many persons distributed so widely over the world.
4. One lever moves upwards, so does the other one.
5. Carbon dioxide does not burn, nor does it support combustion.
6. The ancients had no knowledge of stellar distances, neither was there then any means by which they could determine them.

### III. Эмфатические предложения со словами:

as/ however/ though (although) – как ни/ как бы ни/ какой бы ... ни/ хотя//  
 whoever – кто бы ни/ всякий, кто//  
 whatever – что бы ни/ все, что/ какой бы ни/ всякий, который//  
 wherever – где бы ... ни/ всюду, где/ куда бы ... ни/ всюду, куда//  
 whenever – когда бы/ всякий раз, когда//  
 however that may be – как бы то ни было//

#### **Ex. 3**

Translate the sentences.

1. Important as this question is in itself, the debate on the subject went beyond its original bounds.
2. Strange as it may seem, sulphur dioxide may act as a reducing agent or as an oxidizing agent.
3. Small though it is, the proportion of natural plutonium is apparently greater than it can be thus accounted for.
4. Whatever these considerations may appear at first glance they are of great practical importance.
5. Whoever the author may have been he should have dwelt on this problem.

### IV. Эмфатические сочетания:

it is ... that (who, which) — именно ...;  
 it was not until ... that — только тогда, когда.



#### ***Ex. 4***

Translate the sentences.

1. It is these special properties of sound that are the subject of the present chapter.
2. It was the Dutch physicist, Christian Huygens, who first offered an explanation for the phenomena.
3. It was not until about 1911 that a first really successful theory of atomic structure was suggested by Rutherford.
4. Radioactive phenomena occur within the nucleus, and it is here that mass and positive charge resides.
5. A solenoid carrying a current behaves just like a magnet. It was the great French physicist Ampere who first showed this to be the case.
6. It is just energy which the atom thus yields up that is held to account for the radiation.

#### ***Revise Unit 8.***

Translate the sentences.

1. Positrons have only a short period of existence after their formation. It is for this reason that the positive electron proved so difficult to detect.
2. Satisfactory as this theory may be in many aspects it is far from being probable.
3. In short, it is practically impossible to design a machine so specialized that it will have value only with respect to the field of application originally intended. Nor is there any computer which is superior to any other computer with respect to any problem.
4. It can only have been the close chemical similarity of zirconium and hafnium which prevented the isolation of the latter by chemical means at a much earlier date.
5. It is from experiments on solubility of gases in liquids that Dalton appears first to have derived direct evidence in favour of this view.
6. The value of this mass would not be affected by any systematic error common to all observations not even by such an error which varied uniformly with the time. Nor would small errors in the adopted elements of the sun have any effect upon the result.
7. Prominent among the confirmations of Einstein's hypothesis is the work related to the "photoelectric effect".

8. The “quant” theory, useful as it has proved itself does not yet possess the assured position of the atomic theory of matter.

9. Not until after the humanistic movement revived the study of Greek in Western Europe did Greek words begin to enter the English vocabulary in great quantity.

10. The values so estimated were not so high as we now know them to be, nor were they always accepted, but recognition of the polymeric nature of proteins is as old as the peptide theory.

11. Whatever the cause or causes, the symptoms are the following.

12. Not only are perfect crystals an unattainable ideal, but they would be completely useless for most research studies.

13. It was Thales who taught the Greek sailors to steer their ships by the Pole Star.

14. Thus it is known that birds do not keep direction by orientating themselves in the earth’s magnetic field, neither apparently, does memorizing the route play an essential part.

## UNIT 9. *ENGLISH-RUSSIAN TRANSLATOR’S “FALSE FRIENDS”*

При переводе научно-технической литературы нужно иметь в виду, что некоторые слова могут употребляться как в своем основном значении, которое легко найти в обычном словаре, так и иметь другой смысл. Буквальный перевод в таком случае оказывается либо стилистически неточным, либо приводит к смысловым искажениям.

При подобных затруднениях обращайтесь к словарям, которые называются «Ложные друзья переводчика».

### **Study the examples:**

1. Adequate pressure. — Переводится: правильный выбор давления.

2. Candidate fumer compositions. — Переводится: представляющие интерес газообразующие составы.

3. Vibrational levels of the normal state. — Переводится: возбужденные уровни основного состояния.

**NB! Запомните:**

- 1) academic (*adj*) – фундаментальный, научный, ученый;
- 2) adequate (*adj*) – правильный, надлежащий, пригодный, точный, эффективный, полный;  
adequately (*adv*) – правильно, в достаточной степени, в полной мере;
- 3) adopt (*v*) – применять, использовать;  
adoption (*n*) – использование, внедрение, выбор;
- 4) aggressive (*adj*) – большой, мощный, интенсивный, растущий, жесткий;
- 5) ambitious (*adj*) – перспективный, многообещающий, крупный, серьезный, далекоидущий, внушительный, смелый;
- 6) application (*n*) – приложение, прикладная задача;
- 7) argue (*v*) – считать, указывать;
- 8) candidate (*n, adj*) – вариант, подходящий, возможный, перспективный, заслуживающий внимания, представляющий интерес;
- 9) capitalize on smth (*v*) – использовать, воспользоваться преимуществом;
- 10) champion (*v*) – продвигать, поддерживать использование;
- 11) challenge (*n*) – сложная задача, важная проблема, трудность, перспективная тема;
- 12) commercial (*adj*) – серийный, промышленный, имеющий промышленное значение;
- 13) compromise (*n*) – вариант, снижение, потеря;  
compromise (*v*) – уменьшать, ухудшать;
- 14) concept (*n*) – принцип, метод, способ, подход, процедура;  
concept (*adj*) – предварительный, существующий в виде прототипной модели;
- 15) configuration (*n*) – структура, конструкция, вид, схема;
- 16) conventional (*adj*) – общепринятый, обычный, стандартный;  
conventionally (*adv*) – принято считать;
- 17) critical (*adj*) – очень важный, основной, существенный, значительный, принципиальный;
- 18) delicate (*adj*) – сложный;
- 19) dramatic (*adj*) – значительный, существенный, сильный, резкий;  
dramatically (*adv*) – сильно, резко, ясно, явно, четко, наглядно, убедительно, очень;

- 20) *elegant (adj)* – интересный, оригинальный, удачный, наглядный;
- 21) *evolution (n)* – разработка, постепенный переход, нововведение;
- 22) *exotic (adj)* – редкий, необычный, своеобразный, нетипичный, уникальный, сложный;
- 23) *extensive (adj)* – исчерпывающий, существенный;
- 24) *historical (adj)* – традиционный, классический, предшествующий, сложившийся, хронологический;  
*historically (adv)* – по традиции, всегда, ранее, первоначально;  
*history (n)* – развитие, изменение, зависимость, кривая, график, состояние, процесс, поведение, пример, характеристика;
- 25) *horizon (n)* – перспектива, возможность;
- 26) *idealization (n)* – допущение;  
*ideally (adv)* – желательно;
- 27) *industry (n)* – предприятие какой-либо отрасли промышленности, промышленная фирма;
- 28) *interface (v)* – осуществлять связь, соединять, подключать;
- 29) *intimate (adj)* – непосредственный;
- 30) *intuitively (adv)* – на первый взгляд, можно ожидать, вполне вероятно;
- 31) *massive (adj)* – большой, существенный, обширный, объемный, сильный, мощный;
- 32) *materialize (v)* – становиться фактом, оказываться верным;
- 33) *optimize (v)* – улучшать, способствовать чему-либо;
- 34) *optionally (adv)* – при необходимости, дополнительно;
- 35) *philosophical (adj)* – теоретический, аналитический, методологический;  
*philosophy (n)* – принцип, подход, методика, сущность, идея, взгляд, мнение, соображение, рассуждение, развитие;
- 36) *pioneer (n)* – первый в чем-либо;  
*pioneer (v)* – осуществлять что-либо, впервые применить;  
*pioneering (adj)* – первый, основополагающий, фундаментальный;
- 37) *policy (n)* – метод, подход, процедура, общее положение;
- 38) *progressively (adv)* – в возрастающем количестве;
- 39) *provocative (adj)* – интересный, неожиданный;
- 40) *routinely (adv)* – регулярно, стандартно, обычно, обычным способом, без труда, широко применяемый;
- 41) *scenario (n)* – случай, вариант, подход, картина, положение;

- 42) *specific (adj)* – конкретный, заданный, некоторый, данный, существенный;  
*specifically (adv)* – в частности, точнее говоря, более конкретно, с целью;  
*specification (n)* – характеристика, параметр, конкретизация;  
*specified (adj)* – заданный, характерный, конкретный, выбранный, установленный;  
*specify (v)* – точно определять, указывать, характеризовать;
- 43) *speculate on (v)* – рассуждать о чем-либо, говорить о чем-либо;  
*speculative (adj)* – проблематичный, предположительный, умозрительный;
- 44) *symptomatic (adj)* – характерный;
- 45) *trivial (adj)* – простой, несложный, элементарный;
- 46) *unique (adj)* – особый, отличающийся, характерный, оригинальный;  
*uniqueness (n)* – специфичность;
- 47) *veteran (n)* – специалист.

### ***Exercise***

Translate the sentences.

1. The challenge has been in designing the turbine to direct this additional cooling air where it is really needed.
2. Certainly, overly ambitious estimates in a competitive environment can still undermine any project.
3. However, the interpreter (интерпретатор) does compromise the execution speed.
4. For an investigator of meteorites the basic challenge is deducing the history of the meteorites from ...
5. In addition, an extensive review of previous work in this area is presented.
6. ... there is a massive reliability and quality improvement effort throughout the U.S. semiconductor industry.
7. The challenge now is to explain why the atmosphere of Venus ...
8. “There’s very aggressive support for National’s 32032”, Mr. White says.
9. The wood has been subjected to dramatic humidity changes.
10. ... one of Europe’s most ambitious scientific space missions to date ...

11. Of these, the latter seems to be a good compromise between accuracy and computational simplicity.

12. Lasers are now routinely used in large number of cases to repair detached retinas (отслоение сетчатки).

13. The number of hadrons emitted dramatically increased a hundred-fold.

14. The pressure difference increases dramatically.

15. In this case, all mask levels (уровни маскирования) were unique to the specific design.

16. A complete field history of any class of devices in the Bell System is not practically obtained ...

17. Now they are developing an even more aggressive program.

18. ... a process that Intel has pioneered for all its bipolar memory devices.

19. The algorithm is computationally trivial and requires little memory.

20. Our atomic age has suggested some dramatic changes in fundamental thinking.

21. Symptomatic of such rapid evolution is the proliferation of methods and techniques intended to solve software problems.

22. This is a challenging task which often involves the complete resources of the engineer.

23. Two veterans in the core memory business have developed ...

24. IBM, which has in the past championed a double-lattice structure (структура приборов с доменными решетками) for achieving high densities, is also working with ...

25. An elegant analysis has been made by Gebman.

26. The material in the remaining sections is somewhat speculative.

27. The size and shape of the pockets (углублений) are rather critical.

28. This can be achieved by the use of commercial dye lasers equipped with ...

29. ... better fuel economy with no compromise in truck performance.

30. So far Siemens seems to have mounted the most ambitious efforts.

31. A commercial process for beryllium production ...

32. A more ambitious project would be to develop an elaborate software package.

33. The academic community understands very well that ...

34. The scanning system, which is described in detail elsewhere, is quite simple in concept.

35. The telecommunications and computer industries can be expected to capitalize on high-beam efficiency (рентабельность волоконно-оптических систем) so that ...

36. Power companies are progressively installing the optical-fiber communications systems for power system protection, supervision and control, ...

## UNIT 10.

## MISCELLANEOUS

I. “**One**” как подлежащее *не переводится*. Сказуемое передается неопределенно-личной формой глагола.

*e.g.*

I.1. The similarity one finds in this case is not accidental. (Сходство, которое имеется/ наблюдают/ мы находим...)

I.2. If one keeps in mind these figures, they easily understand why... (Если помнить...)

I.3. The new device enables one to examine the process more thoroughly. (... дает возможность исследовать...)

### **Ex. 1**

Translate the sentences.

1. One should take the precautions mentioned.
2. It takes one much time to make all the necessary calculations.
3. When making experiments of this kind one is faced with still another problem.
4. In order to apply the method mentioned one needs to know the location and shapes of the singularities, hence one is almost restricted to analytic models.

II. “**One**” как слово-заменитель переводится тем *существительным*, которое оно заменяет, или *опускается*.

*e.g.*

II.1. The method is a conventional one. (Метод является общепринятым.)

II.2. The latter method differs radically from the one mentioned above. (... отличается от того, который упомянут...)

II.3. Fahrenheit's construction is the one most often used for household thermometers. (... конструкция, которая используется...)

### ***Ex. 2***

Translate the sentences.

1. Collisions between unlike molecules are the important ones.
2. The result, like the one just described, is in no way surprising.
3. An electron tends to collide with a molecule coming in the opposite direction rather than with one traveling in the same direction.
4. The procedure is straight-forward and is the one followed throughout the experiment.

III. "***That, those***" как слово-заменитель переводится тем *существительным*, которое оно заменяет, или *опускается*.

*e.g.*

III.1. The atomic weight of oxygen is greater than that of carbon. (... больше атомного веса...)

III.2. The diameter of Neptunium is four times greater than that of the Earth. (... больше, чем диаметр Земли.)

III.3. The techniques used have some advantages over those suggested by Palm. (Использованные методики ... по сравнению с теми, что были предложены...)

### ***Ex. 3***

Translate the sentences.

1. Carbon dioxide cannot support life, its properties being different from those of oxygen which it contains.
2. Unlike molecules can be determined by methods like those used earlier for like molecules.



3. Molecules moving from hot regions to cool carry more energy than those moving in the reverse direction.

4. Suppose that the total volume of the gas is  $k$  times that of the molecule.

IV. **Операторы** как заменители сказуемого при переводе, как правило, *опускаются*.

### **NB! Запомните!**

Заменители сказуемого *употребляются после союзов*:

as — *как; так же как; и; а также*

if — *если; если бы*

so — *тоже; также* (в предложении без отрицания)

neither  
nor | *тоже; также* (в предложении с отрицанием)

*e.g.*

IV.1. Sugar dissolves in water. So does common salt. (Сахар растворяется... Соль *тоже*.)

IV.2. Bush is an engineer. So are Grey and Miller. (Grey и Miller *тоже* инженеры.)

IV.3. Dr. Smith cannot come here. Neither can his colleagues. (Коллеги *тоже не* могут приехать.)

### **Ex. 4**

Translate the sentences.

1. The pressure changed, so did the temperature.
2. The velocity of a falling body increases exactly as does the time that it has been falling.
3. A thin liquid film, such as a soap-bubble, tries to pull itself together and reduce its area, much as a stretched elastic sheet would.
4. If a body is at rest and starts to move, its velocity is changed. So is its speed.

## **V. Цепочки слов, образующие термины**

### **NB! Запомните!**

При любом количестве слов в цепочке *определяемым всегда будет последнее существительное*. Слова, стоящие перед ним, будут являться определением к этому существительному.

1.           (1)   (2)   (3)  
**Существительное + существительное + существительное**  
Перевод начинайте с  
(3) *определяемое слово + [(2)+(1)] определение к (3).*

*e.g.*

- 1.1. Gamma-ray sensitivity – чувствительность по гамма лучам.
- 1.2. Energy-charge relation — зависимость заряда от энергии.
- 1.3. Pulse series generator – генератор серии импульсов.

### ***Ex. 5 (to be cont.)***

Translate the word combinations. Keys are given below.

- 1) data transmission equipment
- 2) surface conductivity factor
- 3) power-breeder (type) nuclear reactor
- 4) gamma-radiation detector
- 5) heat equilibrium conditions
- 6) stream-pressure probe
- 7) radio-wave propagation
- 8) oxidation-reduction reaction
- 9) fission chain reaction
- 10) boundary-layer skin frequency
- 11) conduction band electron energy

2.           (1)   (2)   (3)  
**Существительное + причастие наст. времени + существительное**  
Перевод начинайте с  
(3) *определяемое слово + (2) активное определение + (1) существительное.*  
*(Действие [(3)+(2)] направлено на (1).)*

*e.g.*

- 2.1. Positron emitting substance — вещество, испускающее позитроны.
- 2.2. Neutron producing reaction — реакция, производящая нейтроны.
- 2.3. Pulse-counting method — метод подсчета импульсов.

***Ex. 5 (cont.)***

- 12) current-limiting reactor
- 13) heat-insulating substance
- 14) heat generating fluid
- 15) pulse-forming network
- 16) frequency weighing network
- 17) time-varying parameter
- 18) endurance-testing machine
- 19) mass-analyzing magnet
- 20) nuclear reactor loading and unloading machine
- 21) alpha-particle binding energy

**3. (1) (2) (3)**

**Существительное + причастие прош. времени + существительное**

Перевод начинайте с

(3) *определяемое слово* + (2) *пассивное определение* + (1) *существительное*.

(*Действие [(1)+(2)] направлено на (3).*)

*e.g.*

- 3.1. Electron induced shower — ливень, вызванный электронами.
- 3.2. Cadmium enriched rods — стержни, обогащенные кадмием.
- 3.3. Neutron split atoms — атомы, расщепленные нейтронами.

***Ex. 5 (cont.)***

- 22) surface-catalyzed reaction
- 23) ring-shaped magnet
- 24) neutron-induced reaction
- 25) water-cooled and water-moderated reactor
- 26) temperature-stratified atmosphere
- 27) impedance-coupled amplifier
- 28) ferrite-cored coil

- 29) Admiralty measured mile
- 30) negatively ionized ion
- 31) spin-stabilized rocket
- 32) electrically powered rocket
- 33) gamma-induced ionization

## Keys

### Ex. 5

- 1) аппарат передачи данных
- 2) параметр поверхностной проводимости
- 3) энергетический ядерный реактор-размножитель (бридер)
- 4) детектор гамма-излучений
- 5) условия теплового равновесия
- 6) датчик давления в потоке
- 7) распространение радиоволн
- 8) окислительно-восстановительная реакция
- 9) цепная реакция синтеза
- 10) поверхностное трение в пограничном слое
- 11) энергия электрона в зоне проводимости
- 12) токоограничительный реактор
- 13) теплоизоляционный материал
- 14) тепловыделяющая текучая среда
- 15) схема формирования импульсов
- 16) цепь частотной коррекции
- 17) нестационарный (меняющийся со временем) параметр
- 18) прибор для испытания на усталость
- 19) магнитный анализатор (частиц) по массам
- 20) механизм загрузки и разгрузки ядерного реактора
- 21) энергия связи альфа-частицы
- 22) реакция, катализируемая поверхностью
- 23) кольцеобразный магнит
- 24) реакция под действием нейтронов
- 25) водо-водяной реактор (с водяным охлаждением и водой в качестве замедлителя)
- 26) температурно-стратифицированная атмосфера
- 27) усилитель с комплексной связью
- 28) катушка с ферритовым сердечником
- 29) британская адмиралтейская морская миля (1853,184 м).

- 30) отрицательный атомарный ион
- 31) стабилизируемая вращением ракета
- 32) ракета с электрическим или электрореактивным двигателем
- 33) ионизация под действием гамма-излучения (ионизация гамма-квантами)

## UNIT 11.

## *GENERAL REVISION TESTS*

### Test 1

Translate the sentences.

1. Evaporation is known to go on more rapidly the warmer and drier the surrounding is.
2. The amount of polonium to be obtained from a uranium mineral can be simply calculated.
3. Hydrogen is far more volatile than oxygen because of its having a much smaller specific weight.
4. Electrons can be made to travel at very high speeds.
5. The question is how closely these data represent the results likely to be obtained in practice.
6. The relationship that should exist between observations and their interpretation is the one that has not always been clearly defined.
7. For diffraction patterns to show themselves, it is necessary that the width of the slit employed should be of the order of magnitude of the wavelength of the light.
8. With the Earth gradually solidifying from a fluid condition, one heavier substances would be expected to sink toward the center, while the lighter would tend to float upon the surface.
9. It was not until the 19<sup>th</sup> century that heat was proved to be a form of energy.
10. It is sometimes difficult to predict what sort of material is likely to prove suitable for the purpose in mind.
11. It is only the water that appears to be decomposed.
12. This procedure is followed in all methods of positive ray analysis.

13. The survey does not appear to have been published, nor did Dr. Ulrich indicate in his recent lecture how expensive was the analysis to which he referred.

14. General rules predicting the direction in which a process is influenced by outer forces are very desirable from a practical point of view.

15. The energy gap is responsible for semiconductors being opaque and having metallic reflection in the optical region.

## **Test 2**

Translate the sentences.

1. We may suppose the alpha particles within the nucleus to be in motion.

2. The speed of light being extremely great, we cannot measure it by ordinary means.

3. The experimental work was done on alkali metal film reported to be one atom thick.

4. Other conditions being equal, the temperature remains the same.

5. It seems reasonable that the relations found to hold so well for these films should be true in general.

6. The gas to be tested is enclosed in a long glass tube.

7. The work of Rutherford followed by great research work of many other scientists is known to every physicist.

8. Simple substances consist of atoms, each substance having its own special kind of atom.

9. Never has a better oscillator been designed.

10. Valves prevent gas from reaching high pressure.

11. Wax is not a crystal. Nor is glass crystalline.

12. These conditions are found to follow certain perfectly defined rules.

13. Needless to say, the examination of unetched surface should be followed by etching and further examination.

14. Only chemicals known to be chemically pure should be used.

15. The theory in question assumes the variation in conductivity on illumination to result from changes in the density of conductivity, electrons or holes.

### Test 3

Translate the sentences.

1. Except where otherwise expressly stated, the foregoing values are given in the centimeter-gram-second system of units.
2. The photoelectrons do not, in general, all succeed in reaching the anode.
3. To produce a precipitate we must meet two conditions.
4. Work is the result of energy, the latter usually being defined as capacity for doing work.
5. With respect to size several stars have been found to be many million times the size of the sun.
6. Once formed, bubbles rise because of the vapour being less dense than the liquid in which it is suspended.
7. Were the Earth stationary, the movements of the atmosphere would be controlled almost entirely by temperature differences.
8. It is with the cyclotron that this book is concerned.
9. The electron acted on by the field receives acceleration.
10. There seems to be no room for many additional positive ions coming from the negative glow.
11. If we were to remove one electron by some means, a net positive charge would be left.
12. Besides having confirmed certain consequences of Nernst's theory, the results of this investigation have led to the solution of another important problem.
13. Should the excitation remain at the particular atom, both this atom and its neighbours would shift their positions to new equilibrium values, emitting phonons during the process.

### Test 4

Translate the sentences.

1. Increased temperature makes a gas expand.
2. The potential barrier is too high for electrons to go through.
3. Water being denser than air, rays are refracted towards the perpendicular.

4. Unless otherwise specified, the charts and tables are for a perfect gas with a ratio of specific heat of 1.4.

5. All these elements are radioactive, their atoms being unstable and undergoing spontaneous disintegration.

6. The amount of scattering to be expected on the basis of the formula given above was computed by Einstein.

7. The heating elements can be easily exchanged, should the need arise.

8. He was the first to determine the exact weight proportions of the components of water.

9. It is not until Roentgen discovered his mysterious rays that many diseases could be easily diagnosed.

10. That normal gas does conduct somewhat was proved simultaneously by Wilson and Geitel.

11. The efficiency of this process results in the surface atoms being in a high-energy state.

12. Not all the light striking the water surface is reflected, for some of it enters the water and is said to be refracted.

13. Small as the stars appear to us, there are many of them larger and hotter than the sun.

14. Alternatively, both antennas can be located at fixed positions, with provisions being made to rotate the antenna under test.

15. The following example indicates the main features to be considered when one decides whether to use correlation or spectral analysis for a particular problem.

## **Test 5**

Translate the sentences.

1. The reason for having the iron in thin laminations rather than in solid chunk is to prevent induced currents being set up in the iron itself, due to the changing flux through it.

2. Another theory assumes heated gases from the interior bursting through the crust of the Moon as great bubbles.

3. These compounds are alike in solubility and crystalline form, and in being strong oxidizing agents.

4. Under the conditions described the reaction would proceed only with difficulty.

5. The electrons were looked upon as being merely minute corpuscles.



6. Were the intensity of all the beams alike, we should get an opposite result.

7. If there were no air, the stone and the piece of paper would fall together.

8. Johnson found the effect to be much greater at higher than at lower altitudes.

9. No sooner did he replace the first valve than the second ceased to conduct.

10. These data are sufficient to be able to build up a mathematical theory.

11. The numbers given for the atomic weights must not be taken to represent the actual weights in, say, grams or pounds but rather as being proportional to them.

12. There are several precautions to be observed in making such experiments.

13. Nineteenth-century physics succeeded in achieving the complete domination of the phenomena we observe around us.

14. Becquerel's discovery in 1896 was followed by the studies made by Rutherford, Soddy and Curie.

15. General rules predicting the direction in which a process is influenced by outer forces are very desirable from a practical point of view.

## **UNIT 12.**

## ***MAKING SUMMARIES***

This type of work is not difficult if you follow a system. One possible approach is to go through the following steps:

1. Read through the text from beginning to end, underlining all the points which should come into your answer. Do this very carefully. And be sure not to miss anything.

2. Make a list of notes, in which you reproduce very briefly in your own words all the points you have underlined.

A good list is long from top to bottom (it has plenty of points in it), but short from left to right (each point is expressed very briefly).

3. Without looking at the original text, join these points together into a paragraph. Change the order of the points if necessary, to make the construction more logical.

4. Look again at the text, just to check that you have not changed the meaning of anything. Make corrections or rewrite the paragraph if necessary.

5. Use these words and expressions to make your summary sound natural:

The text/ article deals with...  
The object of this study/ paper is...  
The aim/ purpose of this report is...

It seems/ appears that...  
It is interesting/ surprising/ strange that...

According to the author of the paper...  
The author mentions/ speculates that...  
The author speculates on/ about (why/ what...)  
He explains that...  
He argues that...

First of all...  
Secondly...  
In the end...  
At the end of the study/ article...  
Finally...  
Consequently...

In general...  
On the whole...  
In conclusion...  
To sum up...  
In my view/ opinion

Use conjunctions and adverbs to show the connections between the ideas: therefore, however, though, since, at first, then, next, but, nevertheless, in spite of, furthermore, moreover.

## UNIT 13.

## STUDENTS' CONFERENCE

A students' conference is a kind of role play. Its aim is to motivate students to speak in front of the audience, learn how to share ideas and discuss things. It is desirable to divide the group into two teams which would come up with competing ideas: theories, approaches or estimates.

A group of three or four would act as a panel of scientists or a jury — group of lay members of public. These people are to listen, ask questions and at the end of the discussion they are supposed to speak in favour of one of the teams. They should explain why a particular standpoint seemed more solid and the arguments of its advocates turned out more convincing.

The discussion is organized by Chairperson, who is in charge of making a list of speakers, presenting the participants and looking after the time limit for the talks. He or she also opens and closes the discussion.

The speakers are not allowed to read their papers. Put your notes aside, look at your audience, get them interested, win the people's attention!

Divide your talk into logical parts to help your listeners follow the arguments. Start by saying what the talk is about and/or how you gathered the information. Explain why you think this problem is urgent or interesting.

Begin with an interesting introduction – an example, perhaps, or a question. End with an overall comment or a conclusion which gives a summary of the situation.

If you feel that some terms or notions might be unfamiliar to your group-mates, explain their meanings before you start. Use posters, graphs, tables, etc to make your talk interesting and comprehensible.

### *Conference terminology*

- 1) semi-annual conference – конференция, проводимая раз в полгода;  
topical conference – тематическая конференция;  
to attend/ participate in/ take part in a conference – посещать,  
принимать участие в конференции;
- 2) chairperson – председатель;

- 3) panel – специальный комитет, группа специалистов;  
panelist – член специального комитета;
- 4) speaker – докладчик;
- 5) round table discussion — круглый стол;  
panel discussion – дискуссия специалистов в присутствии аудитории;
- 6) paper – доклад;  
background/ principle paper – основной доклад;  
contributed paper – доклад, заявленный по инициативе участника;
- 7) presentation – сообщение, выступление;
- 8) session – заседание;  
to attend a session — посещать;  
to chair/ preside over a session — председательствовать;  
to hold/ run a session — вести;
- 9) agenda – повестка дня;  
to propose/ adopt an agenda — предлагать/ принимать.
- 10) Chairing a discussion: May I have your attention, please?  
The topic of the discussion is...  
I give the floor to ...  
I would like you to speak up, please, Dr.N.  
I'd ask the speaker to be brief.  
Keep to the point, please.  
With this I close the discussion.
- 11) Scientific discussion: I am not convinced about that  
I have some doubts about that  
It is an attractive idea, but...  
I don't agree/ I disagree with...  
I can hardly agree with...  
That's exactly what I object to!  
Our findings show the opposite.  
I have a comment/ a remark on...  
I would like to call your attention to...  
I am going to enlarge the arguments of...  
I would like to summarize a few points...

## UNIT 14.

## *THE EXAM IS ROUND THE CORNER*

### *Text 1*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from "*How To Blow Up A Star*"  
by Wolfgang Hillebrandt, et.al.

On November 11, 1572, Danish astronomer and nobleman Tycho Brahe saw a new star in the constellation Cassiopeia, blazing as bright as Jupiter. In many ways, it was the birth of modern astronomy. Such "new stars" have not ceased to surprise.

In 1934 Fritz Zwicky of the California Institute of Technology coined the name "supernovae" for them. Quite apart from being among the most dramatic events known to science, supernovae play a special role in the universe and in the work of astronomers: seeding space with heavy elements, regulating galaxy formation and evolution, even serving as markers of cosmic regulation.

Zwicky and his colleague Walter Baade speculated that the explosive energy comes from gravity. An alternative emerged in 1960, when Fred Hoyle of the University of Cambridge and Willy Fowler of Caltech conceived of the explosions as giant nuclear bombs. \* When a sunlike star exhausts its hydrogen fuel and then its helium, it turns to its carbon and oxygen. Not only can the fusion of these elements release a titanic pulse of energy, it produces radioactive nickel 56, whose gradual decay would account for the months-long after-glow of the initial explosion.

Both these ideas have proved to be right. Of the supernovae that show no signs of hydrogen in their spectra (designated type I), most (type Ia) appear to be thermonuclear explosions, and the rest (types Ib and Ic) result from the collapse of stars that had shed their outer hydrogen layers. Supernovae whose spectra include hydrogen (type II) are thought to arise from collapse as well. Both mechanisms reduce an entire star to a shell of gase-

ous debris, and gravitational collapse events also leave behind a hyperdense neutron star or, in extreme cases, a black hole.

Even so, explaining supernovae is still a major challenge for astrophysicists. Computer simulations have had trouble reproducing the explosions, let alone their detailed properties. It is reassuringly hard to get stars to explode. They regulate themselves, remaining very stable for millions or billions of years. Even dead or dying stars have mechanisms causing them to peter out rather than blowing up. Figuring out how these mechanisms are overcome has taken multidimensional simulations that push computers to, and beyond, their limits. Only very recently has the situation improved.\*

## *Text 2*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*The Nuclear Option*”  
by John M. Deutch et.al.

Nuclear power supplies a sixth of the world’s electricity. Along with hydropower (which supplies slightly more than a sixth), it is the major source of “carbon-free” energy today. The technology suffered growing pains, seared into the public’s mind by the Chernobyl and Three Mile Island accidents, but plants have demonstrated remarkable reliability and efficiency recently. The world’s ample supply of uranium could fuel a much larger fleet of reactors than exists today throughout their 40- to 50-year life span.

In 2003 we co-chaired a major Massachusetts Institute of Technology (M.I.T.) study, *The Future of Nuclear Power*, that analyzed what would be required to retain the nuclear option. That study described a scenario whereby worldwide nuclear power generation could triple to one million megawatts by the year 2050.

\* If nuclear power is to expand by such an extent, what kind of nuclear plants should be built? A chief consideration is the fuel cycle,

which can be either open or closed. In an open fuel cycle, also known as a once-through cycle, the uranium is “burned” once in a reactor, and spent fuel is stored in geologic repositories. The spent fuel includes plutonium that could be chemically extracted and turned into fuel for use in another nuclear plant. Doing that results in a closed fuel cycle, which some people advocate.

Some countries, most notably France, currently use a closed fuel cycle in which plutonium is separated from the spent fuel and a mixture of plutonium and uranium oxides is subsequently burned again. A longer-term option could involve recycling all the transuranics (plutonium is one example of a transuranic element), perhaps in a so-called fast reactor. In this approach, nearly all the very long lived components of the waste are eliminated, thereby transforming the nuclear waste debate. Substantial research and development is needed, however, to work through daunting technical and economic challenges ...

Recycling waste for reuse in a closed cycle might seem like a no-brainer: less raw material is used for the same total power output, and the problem of long-term storage of waste is alleviated because a smaller amount of radioactive material must be stored for many thousands of years. Nevertheless, we believe that an open cycle is to be preferred over the next several decades. \*

The type of reactor that will continue to dominate for at least two decades, probably longer, is the light-water reactor, which uses ordinary water, containing deuterium as the coolant and moderator. The vast majority of plants in operation in the world today are of this type, making it a mature, well-understood technology.

### ***Text 3***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*The Nuclear Option*”  
by John M. Deutch et.al.

Based on previous experience, electricity from new nuclear plants is currently more expensive than that from new coal- or gas-powered plants. The 2003 M.I.T. study estimated that new light-water reactors would produce electricity at a cost of 6.7 cents per kilowatt-hour. That figure includes all the costs of a plant, spread over its life span, and includes items such as an acceptable return to investors. In comparison, under equivalent assumptions we estimate that a new coal plant would produce electricity at a cost of 4.2 cents per kilowatt-hour. For a new gas-powered plant, the cost is very sensitive to the price of natural gas and would be about 5.8 cents per kilowatt-hour for today’s high gas prices.

\* Some people will be skeptical about how well the cost of nuclear power can be estimated, given past overoptimism, going back to claims in the early days that nuclear power would be “too cheap to meter”. Some might also question the uncertainties inherent in such cost projections. The important point is that the estimates place the three alternatives – nuclear, coal and gas – on a level playing field, and there is no reason to expect unanticipated contingencies to favor one over the other. Furthermore, when utilities are deciding what kind of power plant to build, they will base their decisions on such estimates.

Several steps could reduce the cost of the nuclear option below our baseline figure of 6.7 cents per kilowatt-hour. A 25 percent reduction in construction expenses would bring the cost of electricity down to 5.5 cents per kilowatt-hour. Reducing the construction time of a plant from five to four years and improvements in operation and maintenance can shave off a further 0.4 cent per kilowatt-hour. How any plant is financed can depend dramatically on what regulations govern the plant site. Reducing the cost of capital for a nuclear plant to be the same as for a gas or coal plant would close the gap with coal (4.2 cents per kilowatt-hour). All these reductions in cost of nuclear power are plausible but not yet proved.\*



#### ***Text 4***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from "*The Nuclear Option*"  
by John M. Deutch et.al.

The second big obstacle that a nuclear renaissance faces is the problem of waste management. No country in the world has yet implemented a system for permanently disposing of the spent fuel and other radioactive waste produced by nuclear power plants. The most widely favored approach is geologic disposal, in which waste is stored in chambers hundreds of meters underground. The goal is to prevent leakage of the waste for many millennia through a combination of engineered barriers (e.g. the waste containers) and geologic ones (the natural rock structure where the chamber has been excavated and the favorable characteristics of the hydrogeologic basin). Decades of studies support the geologic disposal option. Scientists have a good understanding of the processes and events that could transport radionuclides from the repository to the biosphere. Despite this scientific confidence, the process of approving a geologic site remains fraught with difficulties.

\* A prime case in point is the proposed facility at Yucca Mountain in Nevada, which has been under construction for two decades. Recently the site was found to have considerably more water than anticipated. It remains uncertain whether the Nuclear Regulatory Commission (NRC) will license the site.

Delays in resolving waste management (even if it is approved, it is unlikely that Yucca Mountain will be accepting waste before 2015) may complicate efforts to construct new power plants.

Perhaps the first country to build a permanent storage site for its high-level nuclear waste will be Finland. In Olkiluoto, the location of two nuclear reactors, excavation has begun on an underground research facility called Onkalo. If all goes according to plan and the necessary government licenses are obtained, the first canisters of waste could be

emplaced in 2020. By 2130 the repository would be complete, and the access routes would be filled and sealed.

To address the waste management problem in the U.S., the government should take title to the spent fuel stored at commercial reactor sites across the country and consolidate it at one or more federal storage sites until a permanent disposal facility is built. The waste can be temporarily stored safely and securely for an extended period. Such extended temporary storage, perhaps even for as long as 100 years, should be an integral part of the disposal strategy. \*

### *Text 5*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from "*The Nuclear Option*"  
by John M. Deutch et.al.

In conjunction with the domestic program of waste management just outlined, the President should continue the diplomatic effort to create an international system of fuel supplier countries and user countries. Supplier countries such as the U.S., Russia, France and the U.K. would sell fresh fuel to user countries with smaller nuclear programs and commit to removing the spent fuel from them. In return, the user countries would forgo the construction of fuel-producing facilities. This arrangement would greatly alleviate the danger of nuclear weapons proliferation because the chief risks for proliferation involve not the nuclear power plants themselves but the fuel enrichment and reprocessing plants. The current situation with Iran's uranium enrichment program is a prime example. A scheme in which fuel is leased to users is a necessity in a world where nuclear power is to expand threefold, because such an expansion will inevitably involve the spread of nuclear plants to some countries of proliferation concern.

\* A key to making the approach work is that producing fuel does not make economic sense for small nuclear power programs. This fact un-

derlies the marketplace reality that the world is already divided into supplier and user countries.

Although the proposed regime is inherently attractive to user nations — they get an assured supply of cheap fuel and are relieved of the problem of dealing with waste materials — other incentives should also be put in place because the user states would be agreeing to go beyond the requirements of the treaty on the nonproliferation of nuclear weapons.

Iran is the most obvious example today of a nation that the global community would rather see as a “user state” than as a producer of enriched uranium. But it is not the only difficult case. Another nation whose program must be addressed promptly is Brazil, where an enrichment facility is under construction supposedly to provide fuel for the country’s two nuclear reactors. A consistent approach to countries such as Iran and Brazil will be needed if nuclear power is to be expanded globally without exacerbating proliferation concerns. \*

### ***Text 6***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*Did Life Come From Another World?*”  
by David Warmflash et.al.

Most scientists have long assumed that life on Earth is a home-grown phenomenon. According to the conventional hypothesis, the earliest living cells emerged as a result of chemical evolution on our planet billions of years ago in a process called abiogenesis. The alternative possibility — that living cells or their precursors arrived from space — strikes many people as science fiction. Developments over the past decade, however, have given new credibility to the idea that Earth’s biosphere could have arisen from an extraterrestrial seed.

\* Planetary scientists have learned that early in its history our solar system could have included many worlds with liquid water, the essential ingredient for life as we know it. Recent data from NASA’s Mars Ex-

ploration Rovers corroborate previous suspicions that water has at least intermittently flowed on the Red Planet in the past. It is not unreasonable to hypothesize that life existed on Mars long ago and perhaps continues there. Life may have also evolved on Europa, Jupiter's fourth-largest moon, which appears to possess liquid water under its icy surface. Saturn's biggest satellite, Titan, rich in organic compounds; given the moon's frigid temperatures, it would be highly surprising to find living forms there, but they cannot be ruled out. Life may have even gained a toehold on torrid Venus. The Venusian surface is probably too hot and under too much atmospheric pressure to be habitable, but the planet could conceivably support microbial life high in its atmosphere. And, most likely, the surface conditions on Venus were not always so harsh. Venus may have once been similar to early Earth.

It is not implausible that life could have arisen on Mars and then come to Earth, or reverse. Researchers are now intently studying the transport of biological materials between planets to get a better sense of whether it ever occurred. This effort may shed light on some of modern science's most compelling questions: Where and how did life originate? Are radically different forms of life possible? And how common is life in the universe? \*

### *Text 7*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from "*The Amateur Scientist*"  
by Jearl Walker

Can the distance to the sun be determined without optical instruments or any other modern equipment? Joseph L. Gerver of Rutgers University has devised a method by which a lower limit can be placed on the mean separation between the earth and the sun. He needs no more than paper, pens and a ruler. A star map is convenient but not essential. With these simple materials and much patience Gerver ascertained that the sun must be at least 65 million kilometers away, which is about half the actual mean distance of 150 million kilometers.

\* Gerver's scheme involves observing a meteor as it penetrates the earth's atmosphere. A meteor, which is debris from a comet or a chunk of material from the asteroid belts, heats up rapidly as it falls through the atmosphere, becoming so hot that its glow is visible from the ground. Nearly all meteors burn up before they leave the upper atmosphere.

Gerver's method is to determine a meteor's speed with respect to the earth by dividing the duration of the glow into the length of the meteor trail. If the meteor is orbiting the sun, the upper limit to its speed with respect to the sun is related to the earth's speed around the sun. By measuring the meteor's speed through the atmosphere you can calculate the earth's speed and then the radius of the earth's orbit of the sun.

Gerver's method is put into practice during a time of meteor showers. To apply the method you should arrange for several observers to be separated from one another by tens of kilometers. Have them record the time and duration of any meteor they sight and also mark the path of the meteors on a star map. The duration of a meteor burn should be timed by a chant such as "One one thousand, two one thousand" and so on to count off the seconds. Later examine the collected data for any common sighting. If you find one, you can employ the relative positions of the observers and their measurements of the meteor to calculate the height of the meteor's end point, which is where it was last seen. \*

At this stage Gerver introduces a check on the results. From the computed end point and the observers' perspectives of it he calculates the compass headings between the observers. If the calculated headings approximate the true ones, he knows he is on the right track.

### ***Text 8***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from "*Dyslexia*"  
by Frank R. Vellutino

Dyslexia is a condition that makes it difficult for someone to read and spell.
--

\* Dyslexia is a generic term that has come to refer to an extraordinary difficulty experienced by otherwise normal children in learning to identify printed words. The condition is commonly believed to originate in the visual-spatial system. Its presence is considered to be signaled by

mirror writing and letter reversal. Dyslexics, it is believed, show uncertain hand preference. Children whose first language is based on alphabetic rather than pictographic or ideographic characters are said to be particularly susceptible to the condition. Finally, dyslexia is widely considered to be correctable by means of therapies aimed at “strengthening” the visual-spatial system. Each of these perceptions, contemporary research shows, is seriously flawed.

It was through the works of the U.S. neuropsychiatrist Samuel Torrey Orton in 1925 that the deficiency first came to be perceived as lying in the visual system. Orton suggested that an apparent dysfunction in visual perception and visual memory, characterized by a tendency to perceive letters and words in reverse (*b* for *d* or *was* for *saw*), caused dyslexia. Such a disorder would also explain mirror writing.

Working at the Child Research and Study Center of the State University of New York at Albany, my colleagues and I have begun to examine, and to challenge, common beliefs about dyslexia, including the notion that the condition stems primarily from visual deficits. Along with other researchers in this country and abroad, we have been finding that dyslexia is a subtle language deficiency. \* The deficiency has its roots in other areas: phonological-coding deficits (inability to represent and access the sound of a word in order to help remember the word); deficient phonemic segmentation (inability to break words into component sounds); poor vocabulary development, and trouble discriminating grammatical and syntactic differences among words and sentences. Far from being a visual problem dyslexia appears to be the consequence of limited facility in using language to code other types of information.

### ***Text 9***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*Making Every Drop Count*”  
by Peter H. Gleick

Over the past 100 years, humankind has designed networks of canals, dams and reservoirs so extensive that the resulting redistribution of freshwater from one place to another and from a small but measurable

change in the wobble of the earth as it spins. The statistics are staggering. Before 1900 only 40 reservoirs had been built with storage volumes greater than 25 billion gallons; today almost 3,000 reservoirs larger than this inundate 120 million acres of land and hold more than 1,500 cubic miles of water — as much as Lake Michigan and Lake Ontario combined. The more than 70,000 dams in the U.S. are capable of capturing and storing half of the annual river flow of the entire country.

In many nations, big dams and reservoirs were originally considered vital for national security, economic prosperity and agricultural survival. Until the late 1970s and early 1980s, few people took into account the environmental consequences of these massive projects. Today, however, the results are clear: dams have destroyed the ecosystems in and around countless rivers, lakes and streams.

As environmental awareness has heightened globally, the desire to protect — and even restore — some of these natural resources has grown.

\* Until very recently, international financial organizations such as the World Bank, export-import banks and multilateral aid agencies subsidized or paid in full for dams or other water-related civil engineering projects — which often have price tags in the tens of billions of dollars. These organizations are slowly beginning to reduce or eliminate such subsidies, putting more of the financial burden on already strained national economies. Having seen so much ineffective development in the past — and having borne the associated costs (both monetary and otherwise) of that development — many governments are unwilling to pay for new structures to solve water shortages and other problems.

A handful of countries are even taking steps to remove some of the most egregious and damaging dams. For example, in 1998 and 1999 two dams in the Loire River basin in France were demolished to help restore fisheries in the region.

Fortunately — and unexpectedly — the demand for water is not rising as rapidly as some predicted. As a result, the pressure to build new water infrastructures has diminished over the past two decades. Although population, industrial output and economic productivity have continued to soar in developed nations, the rate at which people withdraw water from aquifers, rivers and lakes has slowed. And in a few parts of the world, demand has actually fallen. \*

## ***Text 10***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*Making Every Drop Count*”  
by Peter H. Gleick

The idea that a planet with a surface covered mostly by water could be facing a water shortage seems incredible. Yet 97 percent of the world’s water is too salty for human consumption or crops, and much of the rest is out of reach in deep groundwater or in glaciers and ice caps. Not surprisingly, researchers have investigated techniques for dipping into the immense supply of water in the oceans. The technology to desalinate brackish water or saltwater is well developed, but it remains expensive and is currently an option only in wealthy but dry areas near the coast. Some regions, such as the Arabian Gulf, are highly dependent on desalination, but the process remains a minor contributor to overall water supplies, providing less than 0.2 percent of global withdrawals.

\* With the process of converting saltwater to freshwater so expensive, some companies have turned to another possibility: moving clean water in ships or even giant plastic bags from regions with an abundance of the resource to those places around the globe suffering from a lack of water. But this approach, too, may have serious economic and political constraints.

Rather than seeking new distant sources of water, smart planners are beginning to explore using alternative kinds of water to meet certain needs. Why should communities raise all water to drinkable standards and then use that expensive resource for watering lawns? Most water ends up flowing down the drain after a single use, and developed countries spend billions of dollars to collect and treat this wastewater before dumping it into a river or the ocean. Meanwhile, in poorer countries, this water is often simply returned untreated to a river or lake where it may pose a threat to human health or the environment. Recently attention has begun to focus on reclaiming and reusing this water.



New approaches to meet water needs will not be easy to implement: economic and institutional structures still encourage the wasting of water and the destruction of ecosystems. Among the barriers to better water planning and use are inappropriately low water prices, inadequate information on new efficiency technologies, inequitable water allocations, and government subsidies for growing water-intensive crops in arid regions or building dams. \*

### *Text 11*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*Sympathy for the Devil*”  
by Wendee Holtcamp

Tasmanian devil, or “Taz”, resemble a small dog with white splotches. These marsupial carnivores (сумчатые хищники) once lived in mainland Australia but today remain only on its island state of Tasmania.
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During the past 10 years, a contagious and fatal cancer has decimated the world’s Tasmanian devils. Pustulant tumors deform their faces, forcing teeth from their jaws. The devils eventually starve, but not before passing on the virulent cancer. Concerned that the disease could wipe out the devils, conservationists have already started planning how they might reintroduce the species if it goes extinct.

Around 1996, devils with the tumors started appearing in northeast Tasmania. Devil facial disease (DFTD), as it is formally called spread rapidly and now covers at least 56 percent of Tasmania.

\* Scientists initially suspected a virus but were unable to isolate one. Then Anne-Maree Pearse of the Tasmanian DPIW (Department of Primary Industries and Water) made a serendipitous discovery: devil DNA has 14 paired chromosomes, but devil tumor cells had only 13 — and all had identical chromosomal rearrangements. Cancer tumors typically show genetic corruption, but having identical rearrangements would be

nearly impossible. The Best explanation: a rogue cell line emerged in a single devil that has taken on an infectious, cancerous existence.

With the population plummeting and scientific answers potentially years away, conservation biologists are preparing for the worst. In 2006 Australian officials designated the once abundant species “vulnerable to extinction” and shipped 47 diseased-free devils to mainland wildlife park in “Project Ark” — a last-ditch effort to preserve the genetic diversity of devils across Tasmania for captive breeding.

Research is suggesting other DFTD-beating strategies as well. DPIW acknowledges that, despite imperfect information, biologists must move rapidly. The demise of the devil could cause cascading effect in Tasmania’s ecosystem — especially since someone recently introduced red foxes to the area, a carnivore that has driven several local species to extinction. Devils can competitively keep fox population down, because they fill a similar niche.

At this point, there is no single miraculous solution for saving the Tasmanian devil. Biologists still cannot even detect DFTD before tumors appear. But with millions of dollars being pumped into research, “Taz” may just be able to whirl and fight his way into the future.\*

### ***Text 12***

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from *“Nanowires Carved from Silicon Detect Small Traces of Protein and Might Be Amenable to Mass Production”*  
by JR Minkel

Call it the easy-bake nanosensor. Researchers report they have built an exquisitely sensitive biological detector from silicon using conventional tools, meaning it could in principle be massproduced.

\* Relying on standard material and manufacturing techniques would make it much easier to incorporate a nanosensor with the electronics

inside a handheld device, says chemist Mark Reed of Yale University, co-author of a report in this week's *Nature* detailing the technology. "This has the ability to scale in power and cost, just like regular electronics", he says.

Reed and his colleagues coated their 30-nanometer-wide wires in antibodies or other biological molecules capable of latching onto certain proteins. These receptors plucked their matching proteins from a solution washed over the sensor, which detected the change because the electric charges on the amassed proteins easily disrupted the current flowing through the wires. Reed likens the effect to the way that stepping on a flimsy garden hose (but not a tough fire hose) would block its flow.

The device detected as few as 30,000 free-floating proteins in a cubic millimeter of fluid in a matter of seconds, which Reed says compares favourably with other nanowire sensors. It also recognized immune cells by the acid they emit when they bind to antibodies, the group reports. Co-author and Yale bioengineer Tarek Fahmy adds, "There's no other way to do this rapidly with high throughput. This is what we're really excited about."

The researchers carved their device from a high quality wafer of insulation material topped with a thin layer of silicon. They used standard techniques to build a stencil (shaped like the device they wanted), which they placed on the wafer. They then poured a solvent on top that etched away the exposed silicon. \*

Normally such a process would leave relatively thick wires, so to reduce the wires to nanosize they removed the stencil and let the etching continue. Reed says the combination of a good wafer and a slow-acting solvent gave them smoother, more precise nanowires than other groups have achieved by etching.

How long for a version you can hold in your hand? Reed will not speculate, but he says: "This is something I will see in my lifetime."

### *Text 13*

Read the text. Get ready to reproduce it. Write an English-Russian translation of the part marked with asterisks.

Extracted from “*Machine-Phase Nanotechnology*”  
by K. Eric Drexler

In 1959 physicist Richard Freyman gave an after-dinner talk exploring the limits of miniaturization. He set out from known technology, surveyed the limits set by physical law and ended by arguing the possibility — even inevitability — of “atom by atom” construction.

What at the time seemed absurdly ambitious, even bizarre, has recently become a widely shared goal. Decades of technological progress have shrunk microelectronics to the threshold of the molecular scale, while scientific progress at the molecular level — especially on the molecular machinery of living systems — has now made clear to many what was envisioned by a sole genius so long ago.

Inspired by molecular biology, studies of advanced nanotechnologies have focused on bottom-up construction, in which molecular machines assemble molecular building blocks to form products, including new molecular machines.

At the moment, work focuses on the earliest stages: finding out how to build larger structures with atomic precision, learning to design molecular machines and identifying intermediate goals with high payoff.

\* To understand the potential of molecular manufacturing technology, it helps to look at the macroscale machine systems used now in industry. Picture a robotic arm that reaches over to a conveyor belt, picks up a loaded tool, applies the tool to a workpiece under construction, replaces the empty tool on the belt, picks up the next loaded tool, and so on — as in today’s automated factories.

Now mentally shrink this entire mechanism, including the conveyor belt, to the molecular level to form an image of a nanoscale construction system. Given a sufficient variety of tools, this system would be a general-purpose building device, nicknamed an assembler. In principle, it could build almost anything, including copies of itself.

Molecular nanotechnology as a field does not depend on the feasibility of this particular proposal – a collection of less general building de-

vices could carry out the functions mentioned above. But because the assembler concept is still controversial, it's worth mentioning the objections being raised.

One prominent chemist speaking at a recent event sponsored by the American Association for the Advancement of Science asked how one could power and direct an assembler and whether it could really break and re-form strong molecular bonds. These are reasonable questions that can be answered only by describing designs and calculations too bulky to fit in this essay. Fortunately, technical literature providing seemingly adequate answers has been available since at least 1992, when my book *Nanosystems* was published. \*

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Инна Игоревна Кондратьева  
Надежда Анатольевна Некрасова

# GRAMMAR AND VOCABULARY REVISION FOR THE EXAM

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для подготовки студентов III и IV семестров  
к государственному экзамену по английскому языку

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Московский инженерно-физический институт (государственный университет),  
115409, Москва, Каширское шоссе, 31.  
Типография «ТРОВАНТ», г. Троицк Московской области

