

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ МІСЬКОГО  
ГОСПОДАРСТВА імені О.М.БЕКЕТОВА

Методичні вказівки  
до організації самостійної роботи  
з дисципліни

**«Іноземна мова»  
(англійська мова)**

*(для студентів I курсу заочної форми навчання за напрямом підготовки  
6.060101 -«Будівництво» спеціальності «Теплогазопостачання та вентиляція»)*

Харків  
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Методичні вказівки до організації самостійної роботи з дисципліни «Іноземна мова» (англійська мова) (для студентів 1 курсу заочної форми навчання напряму підготовки 6.060101 - «Будівництво» спеціальності «Теплогазопостачання та вентиляція») / Харк. нац. ун-т міськ. госп-ва ім. О. М. Бекетова; уклад. : І.О.Некрасова. - Х. : ХНУМГ, 2013. – 47 с.

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Методичні вказівки до організації самостійної роботи рекомендуються студентам 1 курсу заочної форми навчання напряму підготовки 6.060101 - «Будівництво» спеціальності «Теплогазопостачання та вентиляція». Головною метою збірника є формування навичок читання і розуміння інформації, що відповідає вимогам навчання іноземній мові. Зміст завдань складений за вимогами навчальних програм, а тематика вправ сприяє покращенню навичок читання та письма у студентів.

Затверджено на засіданні кафедри іноземних мов  
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## INTRODUCTION

These educational materials are designed for the students of the 1 course of speciality 'Gas and Heating Supply and Ventilation Systems' to develop their knowledge and skills in English language according to their profession. The purpose of the instructions is to improve students' skills in reading and understanding the authentic texts and translating them into the native language. It is for learners studying English for specific purposes and for those who will need English in their job.

The booklet consists of four units. Each unit presents several texts with the tasks. The tasks are for developing reading, translating, lexical and grammar skills.

The booklet is recommended for students' self-study. It is expected to teach students working at English texts on their own and to increase the level of their knowledge.

We hope that the students will not only learn a lot, but will also enjoy the tasks.

## Unit 1

### Foreign language in the life of a human and society. Higher Education. Economy of UK and the USA.

#### Text 1 'Foreign Languages in Our Life'

Vocabulary:

author - автор

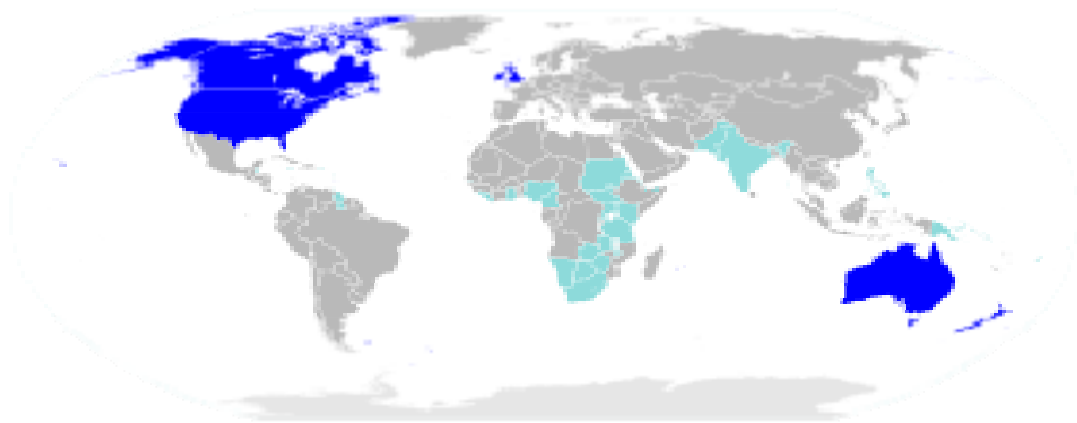
outlook - кругозор

official- официальный

mother tongue - родной язык

effort - усилие

Learning a foreign language isn't an easy thing. Nowadays it's especially important to know foreign languages. Some people learn languages because they need them for their work, others travel abroad, for the third studying foreign languages is a hobby. Everyone, who knows foreign languages can speak to people from other countries, read foreign authors in the original, which makes your outlook wider. I study English. It's a long and slow process that takes a lot of time and efforts. Over 300 million people speak it as a mother tongue. The native speakers of English live in Great Britain, the United States of America, Australia and New Zealand. English is one of the official languages of the United Nations Organization and other political organizations.



■ Countries where English is an official or de facto official language, or national language, and is spoken natively by the majority of the population

■ Countries where it is an official but not primary language

English language is a wonderful language. It's the language of the great literature. It's the language of William Shakespeare, Charles Dickens and others. Half of the world's

scientific literature is in English. It's the language of computers technology. The great German poet Goethe once said, "He, who knows no foreign language, doesn't know his own one". That's why in order to understand oneself and environment one has to learn foreign languages.

To know English today is absolutely necessary for every educated man, for every good specialist.

Questions:

1. Is it an easy thing to learn a foreign language?
2. Why do people learn foreign languages?
3. Do you know any foreign language?
4. Where do the native speakers of English live?
5. What can you say about English language?

True or false:

1. To know English today is absolutely unnecessary for every educated man. ( )
2. Nowadays it's especially unimportant to know foreign languages. ( )
3. Some people study foreign language, because it is their hobby. ( )
4. Studying of a foreign language takes a lot of time and efforts. ( )
5. English is the language of computers. ( )

## **Text 2 'Education in the USA'**

Vocabulary:

free - бесплатный

fee-paying - платный

Elementary education - начальное образование

financial aid - финансовая помощь

tuition fee - плата за обучение

financial hardship - финансовые затруднения

expenses - расходы

swifter - быстрее

The American system of school education differs from the systems in other countries. There are state public schools, private elementary schools and private secondary schools. Public schools are free and private schools are fee-paying. Each state has its own system of public schools.

Elementary education begins at the age of six or seven, when a child goes to the first grade (form). At the age of sixteen schoolchildren leave the elementary school and

may continue their education at one of the secondary schools or high schools, as they call them. The programme of studies in the elementary school includes English, Arithmetic, Geography, History of the USA, Natural sciences and, besides, Physical Training, Singing, Drawing, wood or metal work, etc. Sometimes they learn a foreign language and general history.

Besides giving general education some high schools teach subjects useful to those who hope to find jobs in industry and agriculture or who want to enter colleges or universities. After graduating from secondary schools a growing number of Americans go on to higher education.

The students do not take the same courses. During the first two years they follow a basic programme. It means that every student must select at least one course from each of the basic fields of study: English, Natural sciences, Modern languages, History or Physical education. After the first two years every student can select subjects according to his professional interest.

The National Government gives no direct financial aid to the institutions of higher education. Students must pay a tuition fee. This creates a financial hardship for some people. Many of the students have to work to pay their expenses.

Americans place a high value on education. That's why Kennedy said, "Our progress as a nation can be no swifter than our progress in education".

True or False:

1. The National Government gives no direct financial aid to the institutions of higher education. ( )
2. During the first two years students follow a basic programme. ( )
3. Most Americans go on to higher education. ( )
4. Elementary education begins at the age of six. ( )
5. The American system of school education differs from the systems in other countries. ( )
6. Public schools are free. ( )
7. Each state has its own system of public schools. ( )

Questions:

1. Must students pay a tuition fee?
2. What subjects do some high schools teach besides giving general education?
3. What does the programme of studies in the elementary school include?
4. Does each state have its own system of public schools?
5. Can student select subjects according to his professional interest?
6. Are public schools free?
7. Are private schools fee-paying?

### Text 3 'High Education in Great Britain'

#### Vocabulary:

dominate - доминировать, преобладать

gain - приобретать, получать

federation - федерация, объединение

ordinary - обычный, обыкновенный

existence - существование, жизнь

lodging - сдаваемая комната

Fellows - член совета колледжа, младший научный работник колледжа или университета

don - преподаватель (в Оксфорде и Кембридже)

tutorial system - университетская система обучения путём прикрепления студентов к отдельным консультантам

vary - меняться, различаться

merit - заслуга, достоинство

eminent citizens - именитые граждане

appointment - должность

For seven hundred years Oxford and Cambridge universities dominated the British education. Scotland had four universities, all founded before A. D. 1600. Wales only acquired a university in the 20th century; it consisted of four university colleges located in different cities (Cardiff, Swansea, Bangor, and Aberystwith). The first English university after Oxford and Cambridge (sometimes referred to as Oxbridge) was Durham, in the North of England, founded in 1832. The University of London was founded a few years later in 1836.

During the nineteenth century institutions of higher education were founded in most of the biggest industrial towns, like Birmingham, Manchester, Leeds, Sheffield (sometimes called the Redbrick Universities). At first they did not have full university status but were known as university colleges; since 1945, however, all have become independent universities, and in recent years a number of other universities have been founded: Sussex, Essex, Warwick, and others.

In the middle 60s there was a further new development. Some of the local technical colleges maintained by local authorities had gained special prestige. By 1967 ten of these had been given charters as universities.

Oxford university is a federation of colleges, and it is impossible to understand its structure unless one first understands the nature and function of these colleges, which have no resemblance whatever with the institutions called "colleges" in America. Oxford has twenty-three ordinary colleges for men, five for women.

Each college has a physical existence in the shape of a dining-hall, chapel, and residential rooms (enough to accommodate about half the student membership, the

rest living in lodgings in the town). It is governed by its Fellows (commonly called "dons"), of whom there are usually about twenty or thirty. The dons are also responsible for teaching the students of the college through the tutorial system. The Fellows elect the Head of the college (whose title varies from college to college).

The colleges vary very much in size and extent of grounds and buildings.

Colleges choose their own students, and a student only becomes a member of the University by having been accepted by a college. Students are chosen mainly on academic merit, but the policy of colleges in this respect varies from college to college. Some tend to be rather keen to admit a few men who are very good at rugby or some other sport, or sons of former students or of lords, or of eminent citizens, or of millionaires.

The university teachers are mostly Fellows of colleges, who may at the same time hold university appointments as lecturers or professors. Part of the teaching is by means of lectures and any student- may attend any university lecture. At the beginning of each term (there are three terms in the Oxford academic year) a list is published showing all the lectures being given during the term within each faculty, and every student can choose which lectures he will attend, though his own college tutor will advise him which lectures seem likely to be more useful. Attendance at lectures is not compulsory, and no records of attendance are kept.

Apart from lectures, teaching is by means of the "tutorial" system, which is a system of individual tuition organized by the colleges. Each Fellow in a college is tutor in his own subject to the undergraduates who are studying it. Each student goes to his tutors room once every week to read out an essay which he has written, and for an hour he and the tutor discuss the essay. A student does not necessarily go only to his own tutor but may be assigned to another don in his own college or in another college when he is studying some particular topic which is outside the special interest of his own tutor.

Complete the sentences:

1. Colleges choose their own	a) after Oxford and Cambridge was Durham, in the North of England, founded in 1832.
2. The colleges	b) Oxford and Cambridge universities dominated the British education.
3. Oxford university is a	c) students, and a student only becomes a member of the University by having been accepted by a college.
4. The first English university	d) federation of colleges.
5. For seven hundred years	e) vary very much in size and extent of grounds and buildings.



## Questions:

1. What lectures can a student choose?
2. Is attendance at lectures compulsory?
3. Who are Fellows of college? What are their responsibilities?
4. How students are chosen to the colleges?
5. What is a physical existence of a college?
6. What happened during the nineteenth century?

## Text 4 'Economy of Great Britain'

### Vocabulary

encompass - охватывать, включать в себя

offshore banking statuses - банки, расположенные вне пределов государства

ensures - обеспечивать, гарантировать

heyday - расцвет, зенит

influential - влиятельный, важный

birthplace - родина

usher - проводить

forefront of technological advances - передовая технологического прогресса

reclaim - вернуть

austerity plan - план жёсткой экономии, план строгих мер

implement - осуществлять, выполнять

hamper - мешать, препятствовать

pledge - обещание

to eradicate - искоренить

plots - участки земли

drastically - радикально, кардинально

primary - основной

distribute - распределять

in the wake - вследствие, в результате

Presently UK's economy encompasses those of its home nations – England, Scotland, Wales and Northern Ireland. The Isle of Man and the Channel Isles are also considered to be part of the British Isles but have offshore banking statuses.

As a member of the EU, the UK is part of a single market that ensures the free movement of people, goods, services, and capital within member states. Nevertheless, the UK still maintains its own economy and has chosen to continue using the Pound Sterling as its national currency rather than converting to the Euro.

During its heyday as the British Empire, the UK was the largest and most influential economy in the world. As the birthplace of the first Industrial Revolution during the 18th century, the UK ushered in what economic historians agree to be the most

significant event in mankind's history. The UK was also able to be at the forefront of technological advances during this time, giving it a strong economic advantage over any other country in the world.

However as other countries began to catch up technologically wise, UK's economy was also greatly affected by the two World Wars and the breaking up of the British Empire. Although the UK economy has since recovered, it is unlikely to reclaim its former position as the top economic power in the world.

Today, the UK economy faces another struggle to recover from the 2008 financial crisis.

Part of the reason for UK's slow economic growth has been the austerity plan put into place by the government in 2010. The UK austerity plan was introduced as a method to reduce a massive debt that had reached record levels after the 2008 global financial crisis. Besides cutting public spending and services, the UK government have also implemented a new wave of tax increases as part of its austerity plan. Although these methods can be effective in reducing the risk of a future debt crisis, it also has the ability to hamper economic growth. A recent Financial Times report suggests that the UK's "era of austerity" may stretch to 2020 – two years later than the government's pledge to eradicate the budget deficit by 2018, which had already been revised from 2015.

Although 24.88 percent of the UK is considered to be arable land, vast plots of agricultural land have remained uncultivated.

Apart from its arable land, the UK also has a healthy supply of natural resources. In the past, coal and iron ore was a major player in the UK economy. The UK's primary industry sector was once dominated by coal, which could be found in south Wales, Midlands, Yorkshire, North East England and southern Scotland. However since 1981, the production of coal has fallen drastically by more than 75 percent. In 1981, the UK was the 4th largest coal producing nation in the world – today the UK is ranked 15th.

Iron ore production has also played an important role in UK's industries. As the primary element of steel, iron ore production supports the UK's steel and manufacturing industries. Under manufacturing, it also assists in the production of automobile and aerospace equipment.

The population for the UK in 2012 was 63.244 million. Out of this population, 17.3 percent are aged below fifteen, 65.4 percent are between the ages of fifteen and sixty four, while 17.3 percent are aged sixty-five and above. The age groups are not evenly distributed around the country, with some areas having many young adults and children and some areas having large numbers of older people.

The UK has the 20th largest labour force in the world, with 31.9 million workers. However, unemployment remains high in the UK at 8.02 percent, and is likely to remain so in the wake of the UK's austerity plans. The UK government has warned that nearly half a million jobs could be lost in the public sector alone as the government continues its cut on public spending.

Currently, 1.4 percent of the labour force are employed in agriculture, 18.2 percent in industries and 80.4 percent in services. However, agriculture may soon face a labour crisis due to an aging labour force and a general lack of interest for agricultural jobs.

1. True or false:

1. Iron ore production has also played an important role in UK's industries. ( )
2. The age groups are evenly spread around the country. ( )
3. Almost all arable lands in UK are cultivated. ( )
4. The UK austerity plan was introduced as a method to reduce a massive debt. ( )
5. The massive tax increases are a part of the austerity plan. ( )
6. The austerity plan is one of the reasons of UK's slow economic growth. ( )
7. The UK was the largest and most influential economy in the world. ( )

2. Match the words with definitions:

1. bank	a) the state or quality of being austere
2. heyday	b) having or exerting influence
3. pledge	c) to give out in shares
4. reclaim	d) careful management of resources to avoid unnecessary expenditure or waste
5. encompass	e) an institution offering certain financial services, such as the safekeeping of money, conversion of domestic into and from foreign currencies, lending of money at interest, and acceptance of bills of exchange
6. influential	f) first in importance, degree, rank, etc.
7. primary	g) to enclose within a circle; surround
8. economy	h) the time of most power, popularity
9. distribute	i) a formal or solemn promise or agreement, esp to do or refrain from doing something
10. austerity	j) to claim back

## Text 5 'Economy of the USA'

### Vocabulary

frailties - недостатки

overtake - догнать, настигнуть

experience - испытывать

deflation - дефляция

absorbing - поглощение, амортизация

challenge - вызов, требование

invested-into - инвестируемый

stock - фонд

private individuals - частные лица

counterparts - коллеги

expanding the capital plant - увеличение инвестиций

lay off surplus workers - увольнение лишних рабочих

vanguard - передовая

in technological advances - в техническом прогрессе

onrush - нападение, натиск

two-tier labour market - двухуровневый рынок труда

fluctuations - колебания

simultaneously - вместе, одновременно

leverage - зд. сила

Despite leading the world's economy for more than a hundred years, The US economy is now facing its greatest ever challenge since World War II. This challenge has been a result of both domestic and international factors.

Domestically, the US economy's frailties were cruelly exposed during the 2008 financial crisis. The US economy has found it harder to recover from the 2008 financial crisis, believed to be the worst financial crisis since the Great Depression.

On the international front, it is increasingly likely that the US will lose its status as the world's largest economy. According to the latest IMF forecasts, China is expected to overtake the US by 2016. This has come as a major surprise for the global community – previous forecasts had predicted China overtaking the US by 2035 at best.

For the next five years, the US is expected to experience slow and modest economic growth as it continues its recovery from the 2008 financial crisis.

On the back of the 2008 financial crisis, the US faced deflation for the first time since World War II. Inflation is expected to see increase slightly every year and reach 2.263 percent in 2018. This will go some way into returning to pre-financial crisis levels where the average inflation rate between 2000 to 2008 was 2.89 percent.

Ever since the 1960s, the US economy has been primarily responsible for absorbing global savings. Despite the challenge from emerging economies, the US remains the most heavily invested-into country in the world, with the stock of direct foreign investments at home worth \$2.824 trillion as of 2012. The US is also still the largest investor in the world, investing \$4.768 trillion abroad as of 2012.

The US is a market-oriented economy, where private individuals and business firms make most of the decisions, and the federal and state governments purchase goods and services predominantly from the private marketplace.

US business firms have more flexibility than their counterparts in Western Europe and Japan in decision making when it comes to expanding the capital plant, lay off surplus workers, and develop new products. At the same time, they face higher barriers to entry in competing overseas markets than foreign firms do in the US.

US firms are at or near the vanguard in technological advances, especially in computers and in medical, aerospace, and military equipment. This advantage has narrowed since the end of World War II. The onrush of technology in the US can also explain the gradual development of a two-tier labour market where those at the bottom receive less training and benefits than those at the top.

As such, the US economy is best described as a mixed economy where the economic structure is upheld through the interactions between the private, public and international sector. As the leading economy in the world, fluctuations in the US economy have had far reaching impact on other economies throughout the globe.

Today, the US is the world's largest trading nation – simultaneously leading the world in imports and being among the top two exporting nations in the world. As the top export market for almost 60 trading nations, the US has had a certain degree of economic and political leverage throughout the world, which allows it to shape global policies towards its own.

Despite remaining at the forefront of most industries, the 2008 financial crisis significantly weakened a number of US industries as well. 2008 to 2010 saw three years of negative industrial production growth rate for the US. At the same time other countries such as China, Japan and the EU have caught up and overtaken the US in numerous industries. China, for example, is now the leader in coal, lettuce, rice, pork, beer and wind energy production as well as high technology exports.

The most important factor for the US is its population of 314.184 million. The US has the world's third largest labour force at 154.9 million people.

Questions:

1. What is the US labour force?
2. How is described the US economy?

3. Is the US world's largest trading nation?
4. Do private individuals and business firms make most of the decisions in the US economy?
5. What is the function of government in the US economy?
6. Is the US the most heavily invested-into country in the world?
7. Have ever the US experienced the deflation?
8. What country is expected to overtake the US?
9. Is the US a leader in the world's economy?

Match the words with definitions:

1. economy	a) something that improves or promotes
2. factor	b) the complex of human activities concerned with the production, distribution, and consumption of goods and services
3. crisis	c) an element or cause that contributes to a result
4. status	d) a business partnership
5. growth	e) a social or professional position, condition, or standing to which varying degrees of responsibility, privilege, and esteem are attached
6. increase	f) to make or become greater in extent, volume, size, or scope
7. investments	g) a crucial stage or turning point in the course of something
8. firm	h) the act of investing money
9. to expand	i) grow or expand
10. benefit	j) the process or act of growing, esp in organisms following assimilation of food

## Unit 2

### The profession of an engineer.

#### Ethics and social responsibility of scientists and specialists of new technologies.

#### Economy of Ukraine.

### Text 1 'The profession of an engineer'

#### Vocabulary

specialized knowledge - специализированные знания

require - требовать

to operate - заведовать, управлять

restricted - ограниченный

to differ - отличаться

efforts - усилия, попытки

technically competent - технически компетентный

conformity - согласованность, соответствие

accepted notions - общепринятые представления, идеи

to be interposed - помещён между

distinctness - определенность, четкость

Engineering is often compared to medicine and law in discussions of professional status. It would appear to qualify according to the dictionary meaning of the word. Engineers require specialised knowledge and intensive preparation with continued study after leaving the university. The profession has a strong organizational structure, requires high standards, and operates in the public service. These attributes are commonly associated with the word professional as it is used here. This is a rather restricted interpretation and it differs from its use in describing, say, a professional actor or sportsman who is paid for his efforts, as opposed to an amateur who performs for enjoyment. It is also sometimes used in reference to level of experience so that one speaks of a professional job house painting or plumbing (водопроводное дело). Another use refers to a continued effort over an extended period of time so that one hears reference to a "professional student" as one who spends many years at a university.

Most important is the fact that engineers see themselves as professionals. They have to be technically competent and operate with responsibility in conformity with accepted notions of professionalism.

The type of responsibility is rather different from that of a doctor. The doctor's responsibility is clearly recognizable because of the directness of the doctor-patient relationship. For the engineer, the result of his labors – be it a bridge, air-conditioning unit, automobile or computer – is interposed between himself and the user. However,

since people's lives are often at stake if an error is made, a high level of competence is essential.

There is a certain lack of distinctness about the engineering profession because of the very wide range of activities and individual backgrounds encompassed. The number of people involved is larger than in most other professional areas. For example, in 1960 there were 864,000 engineers, 396,000 accountants and auditors, 214,000 physicians and surgeons, 206,000 lawyers and judges, 81,000 dentists, and 30,000 architects.

Find equivalents to the following words and phrases:

Непрерывное обучение; работать для удовольствия; сравнивать с правом; как упомянуто в; компетентен в области техники; взаимоотношение "врач - пациент"; пользователь; индивидуальный опыт; количество задействованных людей; отсутствие четкости; общепризнанное понятие профессионализма; высокий уровень компетентности; обычно ассоциируется с...; определять значение слова по словарю; ограниченное толкование; тип ответственности; поскольку на ставку поставлена жизнь людей; сделать ошибку; в соответствии с...; широкий диапазон видов деятельности; инженеру требуются специальные знания; чьи усилия оплачиваются; длительный период времени; в отличие от любителя.

Translate the following sentences into English:

1. Тип ответственности инженера иной, чем у врача.
2. Он должен быть компетентен в техническом плане и действовать в соответствии с общепринятыми понятиями профессионализма.
3. Профессия инженера отличается отсутствием четкости, поскольку она включает широкий диапазон видов деятельности и индивидуальный опыт.
4. В отличие от любителей, которые работают для удовольствия, эта профессия требует высоких стандартов.
5. Инженеру требуются специальные знания плюс непрерывное обучение после окончания университета.
6. Значение данного слова определяют по словарю.
7. Эти определения обычно ассоциируются со словом "профессионал".
8. Это довольно ограниченное определение.



9. Усилия профессионального спортсмена оплачиваются.

10. Эта работа будет выполняться в течение длительного периода времени.

11. Поскольку на ставку поставлена жизнь людей, для инженера существенным является высокий уровень компетентности.

12. Количество людей, работающих в этой сфере, намного больше, чем в большинстве других профессиональных областей.

Choose the key words and word-groups describing the profession of an engineer.

### *It's interesting to know*

The first electrical engineer is considered to be William Gilbert, with his 1600 publication of *De Magnete*, who coined the term "electricity".

The first steam engine was built in 1698 by mechanical engineer Thomas Savery. The development of this device gave rise to the industrial revolution in the coming decades, allowing for the beginnings of mass production.

With the rise of engineering as a profession in the 18th century, the term became more narrowly applied to fields in which mathematics and science were applied to these ends. Similarly, in addition to military and civil engineering the fields then known as the mechanic arts became incorporated into engineering.

## **Text 2 'Kinds of engineering'**

### Vocabulary

realm – область, сфера; перен.: царство

to originate – происходить, возникать

to cater – здесь: соответствовать

accepted – общепринятый, общепризнанный

designation – обозначение, указание; предназначение

former – здесь: первый (из названных)

concerned with – связанный с., имеющий отношение к..

propulsion – толчок, движение вперед; движущая сила

latter – второй (из названных)

sophisticated – здесь: опытный

guidance – руководство

to proceed – продолжать, возобновлять; приняться за..; переходить к..; возникать

to cope (with) – справляться с..

complexity – сложность

aircraft – самолет

multitude – множество, большое число

survey – обследование, изыскание  
crop raising – рост/подъем (урожая) зерновых (культур)  
husbandry – разведение, выращивание  
subject (to) – подвергать (воздействию, влиянию)  
soil – почва  
to interface – сталкиваться, встречаться, взаимодействовать  
challenge – вызывать (на соревнование); сомневаться, оспаривать  
reclamation – здесь: исправление  
harvest – собирать (урожай); пожинать плоды  
to encompass – окружать; содержать, заключать (в себе)  
facilities – возможности; оборудование  
paint – краска  
to ground (in) – обучать основам предмета, профессии  
apart (from) – помимо  
civil – гражданский  
to cover – здесь: охватывать, включать  
subsidiary – здесь: вспомогательный, дополнительный  
harbor – гавань  
sewage – сточные воды  
disposal – передача; расположение, размещение  
visible – видимый  
transmission – передача  
recent – недавний  
date back – относиться (к)  
subjected (to) – подверженный, подлежащий  
scrutiny – критическое рассмотрение, внимательное изучение, разбор  
impact – воздействие, влияние  
conversion – передача

Traditionally, engineering activities have been grouped into certain areas of specialization. Several of the more commonly accepted categories are described below.

Aerospace Engineering combines two fields, aeronautical and astronautical engineering. The former is concerned with the aerodynamics, structure and propulsion of vehicles designed for flight in the Earth's atmosphere. The latter relates to flight above the Earth's atmosphere and involves the design of rockets and space vehicles incorporating sophisticated propulsion, guidance, and life support systems.

Agricultural Engineering is one of the earliest forms of engineering practiced by man. It uses agricultural machinery, irrigation, and surveying and deals with the many associated problems of crop raising and animal husbandry. Not only are the fundamental engineering subjects such as hydraulics, metallurgy, and structures of importance, but soil conservation, biology, and zoology are also necessary components. It is here that machines interface with the animal and plant kingdoms.

Challenging problems occur in areas such as land reclamation and efficient utilization, and improved methods of food production and harvesting.

Chemical Engineering encompasses the broad field of raw material and food processing and the operation of associated facilities. It is mainly involved with the manufacture and properties of materials such as fuels, plastics, rubber, explosives, paints, and cleaners. The chemical engineer is well grounded in both basic and engineering chemistry and apart the production of special materials, may be involved in such areas as combustion, recycling of waste products, and air and water pollution.

Civil Engineering is one of the oldest branches of the engineering profession. It covers a wide field, and many subsidiary branches have grown from it. The civil engineer is mainly employed in the creation of structures such as buildings, bridges, dams, highways, harbors, and tunnels. He is usually knowledgeable in hydraulics, structures, building materials, surveying, and soil mechanics. One important area comprises water supply drainage, and sewage disposal. More than any other branch of engineering, the results of the civil engineer's efforts are the most visible in a permanent form.

Electrical Engineering, in general, deals with the creation, storage, transmission, and utilization of electrical energy and information. Most of its activities may be identified with power or communications. Electrical engineering is of recent origin, dating back only to the eighteenth century, when electrical phenomena were first subjected to scientific scrutiny. After this, useful applications were quickly identified. Today, the impact of a power failure graphically illustrates our dependence on electrical power. The field encompasses information systems, computer technology, energy conversion, automatic control, instrumentation, and many other specialties.

Industrial Engineering is mainly concerned with the manufacture of useful commodities from raw materials. Since most of the other engineering fields have bearing on this activity, the industrial engineer requires a particularly broad view. The management of men, materials, machines, and money are all within his endeavor in achieving effective production. Plant layout, automation, work methods, and quality control are included, and, more than in most of the other traditional branches of engineering, the industrial engineer needs to have some grounding in psychology and dealing with personnel.

Mechanical Engineering develops machines for the generation and utilization of power. Mechanical engineers design turbines, engines, pumps, and their ancillary mechanisms and structures. Heating, ventilating, air-conditioning, transportation, manufacturing, and vibration are some areas falling within their domain. The art of mechanical engineering dates back to the labor-saving devices and military machines of ancient times, but it received its greatest boost in the eighteenth century with the invention of the steam engine and industrial machinery, which marked the onset of the industrial revolution.

In addition to the fields identified above, other categories of engineering are often encountered. These include architectural, ceramic, geological naval and marine, nuclear, petroleum, sanitary, and textile engineering.

Questions:

1. What kinds of engineering do you know?
2. What is one of the earliest forms of engineering?
3. What does electrical engineering deal with?
4. Do mechanical engineers design pumps?
5. What kind of engineering is mainly concerned with the manufacture of useful commodities from raw materials?
6. What kind of engineering encompasses the broad field of raw material and food processing?
7. In what kind of engineering machines interface with the animal and plant kingdoms?

Translate into English:

1. Эта сфера включает в себя информационные системы, компьютерные технологии, автоматический контроль и другое.
2. Аэрокосмическая инженерия сочетает в себе две сферы: авиацию и астронавтику.
3. Эта сфера связана с ирригацией, а также со многими проблемами выращивания зерновых.
4. Химический инженер хорошо разбирается в инженерной химии.
5. Электрическая инженерия берёт начало в 18 веке, когда электричество было впервые представлено науке.
6. Управление людьми, материалами и автоматикой – всё включено в промышленную инженерию.

### **Text 3 ‘Ethics and social responsibility of scientists and specialists of new technologies’**

Vocabulary

responsibility - ответственность

application - применение

fulfill - выполнить

justification for a moratorium - обоснование моратория

increasing clarity - увеличивающаяся ясность

unadulterated knowledge - чистейшие знания

indisputable fact - неоспоримый факт

extinguish - уничтожать

to carry out or execute - сознание

to resist - противостоять

curiosity - любопытство

crucial importance - ключевая важность

tremendously dangerous - чрезвычайно опасный

Modern scientific and technological progress has raised a complicated problem of the social responsibility of scientists. Here are some of them: How far are scientists responsible for the application of their work? If they are, how can they best fulfill this responsibility? What is the ethics of scientific exploration, how is it related to the universal ethical values of mankind? Finally a number of scientists have raised the problem of the ethical control of research referring to man, the justification for a moratorium on some fields of research threatening man and the entire mankind. Is such control possible in whatever form? Will it not restrict the freedom of research? How is this freedom related to the social and humanistic responsibility of scientists and technologists?

The very fact that these specific problems are raised at all levels with increasing clarity shows the dissatisfaction with the idea that science is a self-contained and absolute value, a sphere of unadulterated knowledge independent of all other values of humanity and standing above them.

Scientists are realizing more and more clearly the indisputable fact that their social responsibility, the role of the ethical principle in science should grow in geometrical progression, if mankind and science itself are to develop at least in arithmetic progression. There is no alternative to this either for science or for humanity.

In mastering nuclear energy man has developed a power which, unless controlled by his intellect, could extinguish life and snuff out our planet's blue glow. This idea is convincingly proved by the disaster at the Chernobyl atomic power station in Ukraine. Such accidents take place, from lack of knowledge in the fields of natural and technical sciences or from lack of consciousness about the negative consequences of the application of the scientific and technological innovations.

In the event of war, the last lines of civilization's history will be written in thermonuclear ink.

So it is not without reason that modern science is compared to Pandora's Box. Indeed, its eternal curiosity compels mankind to learn what is there beyond the Pillars of Hercules. But has mankind enough common sense, social responsibility and self-control to resist the temptation of dangerous curiosity? This is, in effect, a life-and-death question for mankind.

Science and technology by themselves are not a source of ethics and values. They can tell you what will happen if you do this or that: for instance, how many people might be killed by a nuclear bomb. But the decision on whether to develop the bomb cannot be a scientific decision. This can only be judged by something outside science — ethics. Scientists and technologists should be aware of the consequences of their discoveries, projects.

Hence the crucial importance is attached today to the problem of socio-ethical control of science with a view to its humanistic orientation and development as a science for man. We need a new ethics and it must be many-sided. The belief that only one idea

is true is tremendously dangerous. If you have only one way of looking at the world you abuse it. The new ethics must recognize that there are many ways, out of the human predicament, which present different aspects of the same situation. Only on the basis of such an ethical attitude can we solve the problems which threaten the world today — the destruction of the environment, drugs, AIDS, totalitarianism. It is our duty to share a better world for all of us here on Earth.

Questions:

1. What are the problems of Modern scientific and technological progress?
2. What is the ethical control of research?
3. On your opinion, will control not restrict the freedom of research?
4. Do scientists realize the fact that their social responsibility should grow in geometrical progression?
5. Do we need new ethics?
6. Are we responsible for future generations?

Match words with their definitions:

fulfill	the state or position of being responsible
consciousness	the act of justifying
curiosity	to carry out or execute
responsibility	extremely
justification	an eager desire to know
tremendously	awareness

#### Text 4 'Economy of Ukraine'

##### Vocabulary

to be rich in smth – быть богатым в чем-л.  
 iron and steel industry – металлургическая промышленность  
 outdated and worn-out equipment – устаревшее и изношенное оборудование  
 Europe's granary – зернохранилище Европы  
 crop production – растениеводство  
 animal husbandry – животноводство  
 dairy and beef cattle breeding – молочное и мясное скотоводства  
 pig raising – свиноводство  
 transition from planned-centralized to market-controlled – переход от планово-централизованной к рыночно-контролируемой  
 austere monetary policy – строгая денежная политика  
 twin-level banking structure – двухуровневая банковская система  
 to speed up – ускорять  
 to aim at smth – стремиться к чему-л  
 wide and long-term co-operation – широкомасштабное и долгосрочное

сотрудничество

on the assumption – допуская, что

Ukraine is an agro-industrial country and is rich in natural resources. The main minerals are iron ore, coal, rock salt cement, gypsum uranium, different metals and other natural resources.

Ukraine fully satisfies its needs in minerals but it still has to import some of them. So, oil and gas are imported from Russia and Turkmenistan as the oil and gas deposits of Ukraine cannot satisfy country's needs in these energy resources.

In the current structure of Ukraine's industry a great proportion is occupied by heavy industry, especially, the iron, and steel, machine-building and coal industries.

A considerable part is played by the food, light and chemical industries.

Defence industry is being restructured and converted with emphasis on the output of consumer goods.

However, today's industries are unable to satisfy the consumers' wants because they are not integrated into the world process of economic, technological and scientific progress. The national industries have low standard in processing raw material and outdated and worn-out production equipment.

Ukraine is one of the world's most productive farming regions and is known as "Europe's granary".

There are two main branches of agricultural production in Ukraine: crop production and animal husbandry.

Among the crops grown in Ukraine are sugar beet, wheat, rye, barley, oats, corn, sunflower, a large variety of grain cultures, fruit and vegetables.

The most widespread branches of animal husbandry are dairy and beef cattle breeding and pig raising.

Two interrogated processes characterize Ukraine's economy today, namely its assertion as that of an independent state, and its transition from planned-centralized to market-controlled.

Ukraine has currently achieved macroeconomic stability. Prices, domestic and foreign trade have been liberalized. An austere monetary policy has been introduced. Tax and budget systems are also being reformed. A twin-level banking structure took shape: the National Bank of Ukraine, and commercial banks of all types and forms of property.

"Small-scale" privatization is nearly completed in Ukraine today. Privatization has sped up for large and medium size enterprises, including enterprises in the agro-industrial sector.

Ukraine's foreign policy is aimed at wide and long-term co-operation. Ukraine is acting on the assumption that this is the most effective way of solving not only economic but also political problems.

True or False:

1. Ukraine is known as "Europe's granary". ( )
2. Ukraine has twin-level banking structure. ( )
3. Ukraine grows a large variety of grain cultures. ( )

4. Oil and gas are imported to Ukraine from Russia. ( )
5. Today's industries are unable to satisfy the consumers' needs. ( )
6. The most important industry is heavy industry. ( )
7. "Small-scale" privatization is widespread in Ukraine today. ( )

Translate into English:

1. Приватизация ускорилась для крупных и средних предприятий, включая агропромышленный сектор.
2. Самыми важными секторами животноводства являются выращивание крупного рогатого скота и свиноводство.
3. В Украине две наиболее важные отрасли производства: выращивание зерновых и животноводство.
4. Современные отрасли промышленности не интегрированы в мировой процесс экономического, технологического и научного прогресса.
5. Украина достигла макроэкономической стабильности.
6. Налоговая система нуждается в реформации.
7. В Украине необходимо решить не только экономические, но и политические проблемы.



**Unit 3**  
**Introduction to the professional field.**  
**Environmental Issues.**

**Text 1 ‘Three Natural Resources used by Industries’**

Vocabulary

support - поддерживать  
constitute - составлять  
usage - использование  
recession - спад, снижение  
decommission - списывание  
estimate - оценка  
conserving - сохранение  
grasp - понимать, осознавать  
declare - объявлять  
obtainment - получение  
crude oil - неочищенная(сырая) нефть  
proven - доказанный  
consumption - потребление  
recycle - перерабатывать  
fueled - снабжаемый  
pursue - продолжать поиски

The 'Big Three', or the three natural resources industries use most, are coal, oil and gas. In this article, the size of the reserves will be discussed, along with how long these three resources can keep supporting the population and meeting the global demand.

Industrial users consume roughly 40% of the total world energy consumption. When considering which resources are being used, one thinks of the ‘Big Three’, coal, oil and gas. These are the three natural resources industries use most and they also constitute about 85% of the total global energy usage.

About 77% of the global coal production, 10% of the global oil production and 38% of the global gas production are used by industries.

**Coal**



In 2007, 132.7 quadrillion BTU (British thermal unit: unit of energy equal to about 1055,05585 joules) of coal was produced globally. Over half of this came from Asia.

Due to the global recession and the decommissioning of several mines in China, it is expected that the total coal production will be a little lower.

The total recoverable reserves of coal are estimated to be around 909 billion tons. This is estimated to be enough for roughly the next one hundred years. Yet, these are only estimates. Since industrial activity is increasing, certainly in the Asian region, with the strongly growing economies of China and India, this estimate might turn out to be too optimistic.

So, in order to anticipate future scarcity, it might be a good idea to start conserving coal. It seems that this understanding is finally being grasped by policymakers as well. Earlier this year, the Environmental Protection Agency declared new and more strict rules for the obtainment of mining permits.

*Major producers:* China, USA, European Union, India and Australia.

*Major exporters:* Australia, Indonesia, Russia, USA and Colombia.

*Major importers:* Japan, South Korea, India, Taiwan and Germany.

## Oil



In early 2010, the proven world oil reserves were estimated at 1.345 billion barrels (which is about 1 percent higher than in 2009). Proved reserves of crude oil are the estimated quantities that, according to geological and engineering data, can be recovered in future years from known reservoirs, assuming existing technology and current economic and operating conditions. More than half of the total reserves are located in the Middle East.

When considering the amount of oil reserves, one has to keep in mind that besides the proven oil reserves, there are also unproven oil reserves, meaning that these are, under current economical and technological conditions, unlikely to be recovered. The estimates of proven oil reserves show that there is enough oil to last for about 50 – 150 years, at the current production level.

However, it is reasonable to assume that the consumption level will rise, with the emerging economies in Eastern Asia and the still growing demand from the West. So, preservation efforts might not be a bad idea. In order to achieve this, alternatives have to be developed, which is indeed happening. From biofuel to safer nuclear power, alternatives are being developed globally.

*Major producers:* Saudi-Arabia, Russia, U.S.A, Iran and China.

*Major exporters:* Saudi-Arabia, Russia, Norway, Iran and the United Arab Emirates.

*Major importers:* U.S.A., Japan, China, Germany and South Korea.

## Gas



In early 2010, the world's total proven gas reserves were estimated at 6.609 trillion cubic feet, which is 6 percent higher than in 2009. Three quarters of these reserves can be found in the Middle East and Eurasia. Over half of the reserves are located in Russia, Iran and Qatar.

Despite this increase in reserves, the high rates of increase in gas consumption over the past decades lead to estimates of 60 years for which there will be enough gas, at the current production level.

Since it is not unreasonable to assume that the consumption of gas will increase, alternatives should be researched, which is happening. These range from alternative resources, such as solar energy, wind energy, biofuel, and so on, to new technologies to extract or recycle gas.

*Major producers:* Russia, U.S.A, Canada, India and Iran.

*Major exporters:* Russia, Canada, Norway, Algeria and the Netherlands.

*Major importers:* U.S.A., Japan, Germany, Italy and Ukraine.

### **Industry fueled by the 'Big Three', but for how long?**

So, it can be roughly stated that if everything remains as it is, these three natural resources industries most often used can keep the economy going for about a century. However, because the human population is still rising and the global economy is still growing, this might be a very optimistic estimate.

Considering this, it is a good idea to pursue alternative routes to produce energy. Solar energy, wind energy, biofuels, safe nuclear power, and so on. Not only for our own health and well-being, but also for the environment and the survival of future generations.

Match the words with their definitions:

usage	to pass (a substance) through a system again for further treatment or use
fuel	to make up; form; compose
recession	the act or a manner of using
constitute	any substance burned as a source of heat or power
recycle	a temporary depression in economic activity or prosperity
declare	to grip (something) firmly with or as if with the hands
grasp	to make clearly known or announce officially

Complete the sentences:

1. However, it is reasonable to assume	a) are coal, oil and gas.
2. The 'Big Three', or the three natural resources industries use most,	b) to be around 909 billion tons.
3. The estimates of proven oil reserves show that	c) that the consumption level will rise, with the emerging economies in Eastern Asia and the still growing demand from the West.
4. The total recoverable reserves of coal are estimated	d) there is enough oil to last for about 50 – 150 years, at the current production level.
5. Industrial users	e) the consumption of gas will increase, alternatives should be researched, which is happening.
6. Due to the global recession and the decommission of several mines in China,	f) consume roughly 40% of the total world energy consumption.
7. Since it is not unreasonable to assume that	g) it is expected that the total coal production will be a little lower.

## Text 2 'Industrial ecology'

### Vocabulary

flow - поток

extract - извлекать

commodities - предметы потребления

shifting - переключение

linear - линейный

open loop - разомкнутая петля

inputs - затраты, первоначальные материалы

metabolism - обмен веществ

ecoregion - экорегион

metaphor - образ

exploit - разработать

inspire - вдохновлять

sustainable design - поддерживаемый дизайн

redefining - перераспределение

stewardship - управление

Industrial ecology (IE) is the study of material and energy flows through industrial systems. The global industrial economy can be modeled as a network of industrial processes that extract resources from the Earth and transform those resources into commodities which can be bought and sold to meet the needs of humanity.

Industrial ecology is concerned with the shifting of industrial process from linear (open loop) systems, in which resource and capital investments move through the system to become waste, to a closed loop system where wastes can become inputs for new processes.

- Much of the research focuses on the following areas:
- material and energy flow studies ("industrial metabolism")
  - dematerialization and decarbonization
  - technological change and the environment
  - life-cycle planning, design and assessment
  - design for the environment ("eco-design")
  - extended producer responsibility ("product stewardship")
  - eco-industrial parks ("industrial symbiosis")
  - product-oriented environmental policy
  - eco-efficiency

Industrial ecology seeks to understand the way in which industrial systems (for example a factory, an ecoregion, or national or global economy) interact with the biosphere. Natural ecosystems provide a metaphor for understanding how different parts of industrial systems interact with one another, in an "ecosystem" based on resources and infrastructural capital rather than on natural capital. It seeks to exploit the idea that natural systems do not have waste in them to inspire sustainable design.

Along with more general energy conservation and material conservation goals, and redefining commodity markets and product stewardship relations strictly as a service economy, industrial ecology is one of the four objectives of Natural Capitalism. This strategy discourages forms of amoral purchasing arising from ignorance of what goes on at a distance and implies a political economy that values natural capital highly and relies on more instructional capital to design and maintain a unique industrial ecology.

Answer the questions:

1. What are the researching areas of industrial ecology?
2. What are the problems of industrial ecology?
3. How does industrial ecology react?
4. What does industrial ecology encourage?
5. What is a linear system?
6. Can you describe the global industrial economy?

Match the words with their definitions:

flow	to arouse (with a particular emotion or to a particular action)
exploit	administration , management , control
inspire	to take advantage of (a person, situation, etc.)
stewardship	to move or be conveyed as in a stream
sustainable	an area defined by its environmental conditions, esp climate, landforms, and soil characteristics

ecoregion	an exchangeable unit of economic wealth, esp a primary product or raw material
commodities	capable of being sustained

### Text 3 ‘Environmental Issues: air pollution’

#### Vocabulary

contribute - способствовать

substance - вещество

emit - выделять

pump - накачивать

swamp - болото

livestock - домашний скот

propellant - топливо

deteriorating - разрушающий

srew - извергать

exaggerate - усиливать

curb - сдержанть, обузданть

incentives - стимулы

conserve - сбереганть



Smog hanging over cities is the most familiar and obvious form of air pollution. But there are different kinds of pollution—some visible, some invisible—that contribute to global warming. Generally any substance that people introduce into the atmosphere that has damaging effects on living things and the environment is considered air pollution.

Carbon dioxide, a greenhouse gas, is the main pollutant that is warming Earth. Though living things emit carbon dioxide when they breathe, carbon dioxide is widely considered to be a pollutant when associated with cars, planes, power plants, and other human activities that involve the burning of fossil fuels such as gasoline and natural gas. In the past 150 years, such activities have pumped enough carbon

dioxide into the atmosphere to raise its levels higher than they have been for hundreds of thousands of years.

Other greenhouse gases include methane—which comes from such sources as swamps and gas emitted by livestock—and chlorofluorocarbons (CFCs), which were used in refrigerants and aerosol propellants until they were banned because of their deteriorating effect on Earth's ozone layer.

Another pollutant associated with climate change is sulfur dioxide, a component of smog. Sulfur dioxide and closely related chemicals are known primarily as a cause of acid rain. But they also reflect light when released in the atmosphere, which keeps sunlight out and causes Earth to cool. Volcanic eruptions can spew massive amounts of sulfur dioxide into the atmosphere, sometimes causing cooling that lasts for years. In fact, volcanoes used to be the main source of atmospheric sulfur dioxide; today people are.

Industrialized countries have worked to reduce levels of sulfur dioxide, smog, and smoke in order to improve people's health. But a result, not predicted until recently, is that the lower sulfur dioxide levels may actually make global warming worse. Just as sulfur dioxide from volcanoes can cool the planet by blocking sunlight, cutting the amount of the compound in the atmosphere lets more sunlight through, warming the Earth. This effect is exaggerated when elevated levels of other greenhouse gases in the atmosphere trap the additional heat.

Most people agree that to curb global warming, a variety of measures need to be taken. On a personal level, driving and flying less, recycling, and conservation reduces a person's "carbon footprint"—the amount of carbon dioxide a person is responsible for putting into the atmosphere.

On a larger scale, governments are taking measures to limit emissions of carbon dioxide and other greenhouse gases. One way is through the Kyoto Protocol, an agreement between countries that they will cut back on carbon dioxide emissions. Another method is to put taxes on carbon emissions or higher taxes on gasoline, so that people and companies will have greater incentives to conserve energy and pollute less.

True or false:

1. There are many methods to limit emissions of carbon dioxide. ( )
2. Most people do not want to curb global warming. ( )
3. There are two main pollutants associated with climate change. ( )
4. Living things emit carbon dioxide when they breathe. ( )
5. There is only kind of pollution. ( )
6. People used to be the main source of atmospheric sulfur dioxide; today volcanoes are.
7. Carbon dioxide is a pollutant when associated with cars, planes, power plants, and other human activities that involve the burning of fossil fuels such as gasoline and natural gas. ( )
8. The lower sulfur dioxide levels may actually make global warming worse. ( )

Complete the sentences:

1. In the past 150 years, such activities have pumped enough carbon dioxide into the atmosphere \_\_\_\_\_ higher than they have been for hundreds of thousands of years.
2. Generally any substance that people introduce into the atmosphere that has \_\_\_\_\_ on living things and the environment is considered air pollution.
3. This effect is exaggerated when elevated levels of other greenhouse gases in the atmosphere \_\_\_\_\_.
4. But there are different kinds of pollution—some visible, some invisible—that \_\_\_\_\_.
5. On a personal level, driving and flying less, recycling, and conservation reduces a person's "carbon footprint"— \_\_\_\_\_ into the atmosphere.
6. One way is through the \_\_\_\_\_, an agreement between countries that they will cut back on carbon dioxide emissions.
7. Methane comes from such sources as \_\_\_\_\_ and gas emitted by livestock.

#### **Text 4 'Environmental Issues: Climate Change and Global Warming'**

##### Vocabulary

events - события

indicators - показатели

glaciers - ледники

conjunction - сочетание

trap - ловить

life-enabling - поддерживающий жизнь

potent - мощный

significant - значительный

imbalance - дисбаланс

human-induced - произведённый человеком

rapid - быстрый

current trajectory - текущая траектория

Global warming and climate change refer to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in average global temperatures. This is caused primarily by increases in "greenhouse" gases such as Carbon Dioxide (CO<sub>2</sub>).

A warming planet thus leads to a change in climate which can affect weather in various ways, as discussed further below.



## What are the main indicators of Climate Change?

As explained by the US agency, the National Oceanic and Atmospheric Administration (NOAA), there are 7 indicators that would be expected to increase in a warming world (and they are), and 3 indicators would be expected to decrease (and they are):



Air temperature near surface, humidity, temperature over oceans, sea surface temperature, sea levels, ocean heat content and temperature over land are all increasing, while glaciers, snow cover and sea ice are all decreasing.

## What is the Greenhouse Effect?

The term greenhouse is used in conjunction with the phenomenon known as the greenhouse effect:

Energy from the sun drives the earth's weather and climate, and heats the earth's surface;

In turn, the earth radiates energy back into space;

Some atmospheric gases (water vapor, carbon dioxide, and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse;

These gases are therefore known as greenhouse gases;

The greenhouse effect is the rise in temperature on Earth as certain gases in the atmosphere trap energy.

Six main greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) (which is 20 times as potent a greenhouse gas as carbon dioxide) and nitrous oxide (N<sub>2</sub>O), plus three fluorinated industrial gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). Water vapor is also considered a greenhouse gas.

### **The Greenhouse effect is natural. What do we have to do with it?**

Many of these greenhouse gases are actually life-enabling, for without them, heat would escape back into space and the Earth's average temperature would be a lot colder.

However, if the greenhouse effect becomes stronger, then more heat gets trapped than needed, and the Earth might become less habitable for humans, plants and animals.

Carbon dioxide, though not the most potent of greenhouse gases, is the most significant one. Human activity has caused an imbalance in the natural cycle of the greenhouse effect and related processes.

The other difference between the natural carbon cycle and human-induced climate change is that the latter is *rapid*. This means that ecosystems have less chance of adapting to the changes that will result and so the effects felt will be worse and more dramatic if things continue along the current trajectory.

Answer the questions:

1. What is the Greenhouse effect?
2. What are the main greenhouse gases?
3. What are the indicators of climate change?
4. Is there any connection between global warming and climate change?
5. Describe the phenomenon of greenhouse effect.
6. What is the difference between the natural carbon cycle and human-induced climate change?
7. Is greenhouse effect natural?

Complete the sentences:

1. If the greenhouse effect becomes stronger,	a) have less chance of adapting to the changes.
2. This means that ecosystems have less chance of adapting to the changes	b) and heats the earth's surface.
3. Human activity has caused	c) then more heat gets trapped than needed, and the Earth might become less habitable for humans, plants and animals.
4. Energy from the sun drives the earth's weather and climate,	d) to an increase in average global temperatures.
5. A warming planet thus leads to a change in climate	e) an imbalance in the natural cycle of the greenhouse effect and related processes.
6. Natural events and human activities are believed to be contributing	f) an increase in average global temperatures.
7. Global warming and climate change refer to	g) which can affect weather in various ways, as discussed further below.

## Unit 4

### Heating and ventilation as the part of civil engineering

#### Text 1 ‘What Are the Different Types of Heating Systems?’

##### Vocabulary

heating system - система отопления

forced air - нагнетаемый воздух; сжатый воздух

radiant heat - лучистая теплота

hydronic heat - гидравлическое тепло

steam radiant heat - радиатор парового отопления

geothermal heat - геотермальное тепло

residential structures - жилые здания

furnace - печь

ductwork and vents - воздуховоды и вентиляционные отверстия

filtered - отфильтрованный

humidified - увлажнённый

dehumidified - осушенный

maintenance - обслуживание

retain - поддерживать

ceiling panels - потолочные панели

hot water baseboard system - система тёплых плинтусов

upright units - вертикальные приспособления

hazards - опасность, риск

When building a new home, there are many different types of heating systems to consider. Some types of heating systems are forced air, radiant heat, hydronic, steam radiant, and geothermal. Each type of heat should be considered for its effectiveness in meeting the budget and heating and cooling needs for the home.

The forced air heating system is most commonly seen in residential structures. It works by heating air in a furnace and then forcing the air out into various areas of the home through installed ductwork and vents. It is also commonly known as a central heating system because it comes from a central point in the home, where it can be filtered, humidified, or dehumidified. The air can be heated with various methods, including electricity, natural gas, propane, or oil. Since this system can be used to address both heating and cooling, the system is convenient for many people.

The ductwork required to use this system takes space in walls, so it may be difficult to install this system in an older home, and can require extra planning with new construction. The furnace system used may be noisy and heard throughout the home. This system can also move allergens throughout the house as the air circulates. The air filtration systems will require regular maintenance to retain optimal function. This system can be expensive due to maintenance costs.

The radiant heat heating system is often praised for its ability to produce natural and comfortable heat in a home. In this system, heat is commonly delivered through a

system of hot water tubes underneath the floor, although these tubes can also be installed in ceiling panels. The hot water is heated using a boiler which is usually powered by oil, natural gas, propane, or electricity. A heating stove may also be used to heat the water, powered by coal or wood.

Radiant heat is often slow to heat a room because the water must first be heated and circulated through the pipes. It can be expensive to install and maintain because of the difficulty involved in getting to the tubing systems if a problem occurs with the system. Air conditioning is not available with this method, as it requires a completely separate system of ductwork.

Hydronic heat is also known as a hot water baseboard system. Much like radiant heat systems, a boiler heats hot water, which then is circulated through tubes; for hydronic heat, these tubes are located in baseboard heating units attached to the walls in each room of the home. These systems are usually quiet, energy efficient, and may be fueled by electricity, oil, or natural gas. Temperature can usually be controlled separately in each room. Baseboard units should not be blocked by curtains or furniture, making them inconvenient for some users, and as with radiant heat, hydronic systems can be slow to warm a room and require a separate cooling system.

Steam radiant heating systems heat a room through upright units referred to as "radiators." These systems use either one or two pipes, and heat water through a variety of methods such as electricity, oil, or natural gas. While these units may be energy efficient and warm a room quickly, they can be inconvenient for furniture placement, as the walls and surrounding area must be clear to avoid fire hazards. Many people do not like the way radiators look in a room, and therefore choose another heating system. A separate system is also required for cooling.

Geothermal heating systems are a more recent option for heating and cooling a home. These systems can be expensive to install; however, because of their ability to use the heat from the Earth to regulate temperature, they are said to greatly reduce the costs associated with heating and cooling a home. This system works for both heating and cooling because it uses the relatively constant temperature of the ground.

When a homeowner is choosing a heating system for his home, he should consider how the system will be powered in addition to how much it will cost. Considering that many of these options require separate cooling systems, it may be best to use a central heating system to combine heating with cooling in those regions where both are required. Focusing on specific needs will assist homeowners with making a decision about which system to use.

Match the words with their definitions:

furnace	to keep in one's possession
maintenance	exposure or vulnerability to injury, loss, evil, etc
retain	an enclosed chamber in which heat is produced to generate steam
hazards	the act of maintaining or the state of being maintained
forced air	of or relating to the heat in the interior of the earth
geothermal	the gas or vapour into which water is changed when boiled
steam	air that is pressed

Answer the questions:

1. Name the different types of heating systems.
2. What system is common in residential structures?
3. What are the negative sides of using a furnace?
4. What are the negative sides of using a central heating system?
5. Describe the radiant heat heating system.
6. What a homeowner should consider while choosing a heating system for his home?
7. What heating system is based on using pipes?
8. What is the most expensive heating system?

## **Text 2 'Air conditioner'**

### Vocabulary

condense - конденсироваться

refrigerating air - охлаждённый воздух

vapor-compression cycle - цикл сжатия пара

employ - использовать

coil - катушка

evaporator - испаритель

condenser - конденсатор

serpentine tubing - спиральная трубка

aluminum fins - алюминиевые пластины

compressor - компрессор

refrigerant - охлаждающее вещество

halogenated chlorofluorocarbons - галогенизированный хлорфлуороуглерод

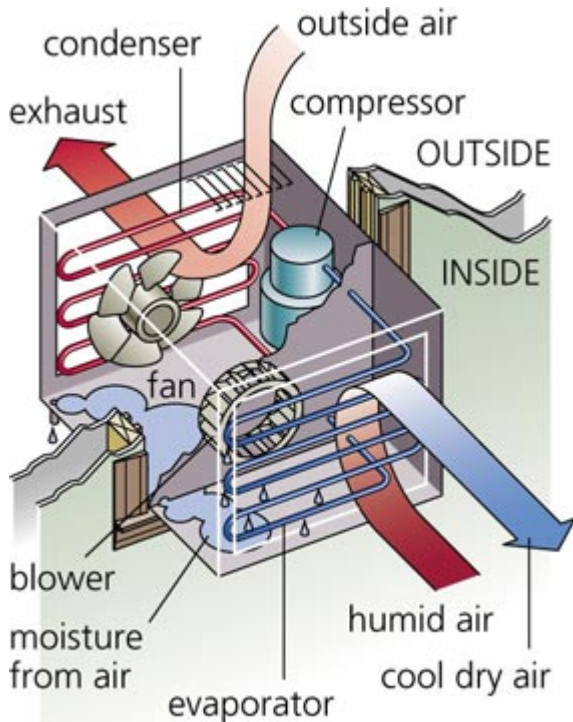
phase out - постепенно прекращать

ammonia - аммиак

An air conditioner removes heat and moisture from the air by passing it over a cold surface. When warm, moist "inside" air is blown across the surface of the unit's cooling coil, the air temperature drops and the water vapor in it condenses making the air cooler and drier and therefore more "comfortable."

Refrigerating air for comfort inside the home, (called air conditioning) is far more complicated than heating. Instead of using energy to create heat, air conditioners use energy to remove heat. The most common air conditioning systems use what is known as a vapor-compression cycle similar to the one used by a refrigerator. The primary difference is a refrigerator moves heat out of its interior and releases it to the surroundings, (usually the kitchen), while air conditioners take heat from inside the house and release it to the outside environment.

Air conditioners use about 5% of all the electricity produced in the United States, at a cost of over \$11 billion to homeowners. As a result, roughly 100 million tons of carbon dioxide are released into the air each year – an average of about two tons for each home with an air conditioner. Switching to high-efficiency air conditioners and taking other actions to keep your home cool could reduce this energy use by 20-50%. How it works



An air conditioner employs the same operating principles and basic components as your home refrigerator. Refrigerators use energy (usually electricity) to transfer heat from the cool interior of the refrigerator to the relatively warm surroundings of your home; likewise, an air conditioner uses energy to transfer heat from the interior of your home to the relatively warm outside environment.

An air conditioner cools your home with a cold indoor coil called the evaporator. The condenser, a hot outdoor coil, releases the collected heat outside. The evaporator and condenser coils are serpentine tubing surrounded by aluminum fins. This tubing is usually made of copper.

A pump, called the compressor, moves a heat transfer fluid (or refrigerant) between the evaporator and the condenser. The pump forces the refrigerant through the circuit of tubing and fins in the coils.

The liquid refrigerant evaporates in the indoor evaporator coil, pulling heat out of indoor air and thereby cooling your home. The hot refrigerant gas is pumped outdoors into the condenser where it reverts back to a liquid, giving up its heat to the outside air flowing over the condenser's metal tubing and fins.

Throughout the second half of the 20th century, nearly all air conditioners used chlorofluorocarbons (CFCs) as their refrigerant, but because these chemicals are damaging to Earth's ozone layer, CFC production stopped in the United States in 1995. Nearly all air conditioning systems now employ halogenated chlorofluorocarbons (HCFCs) as a refrigerant, but these are also being gradually phased out, with most production and importing stopped by 2020 and all production and importing stopped by 2030.

Production and importing of today's main refrigerant for home air conditioners, HCFC-22 (also called R-22), will begin to be phased out in 2010 and will stop entirely by 2020. However, HCFC-22 is expected to be available for many years as it is recovered from old systems that are taken out of service. As these refrigerants are

phased out, ozone-safe hydrofluorocarbons (HFCs) are expected to dominate the market, as well as alternative refrigerants such as ammonia.

Complete the sentences:

1. Air conditioners use about 5% of	a) chlorofluorocarbons (CFCs) as their refrigerant.
2. The most common air conditioning systems use what is known as	b) (called air conditioning) is far more complicated than heating.
3. Throughout the second half of the 20th century, nearly all air conditioners used	c) heat and moisture from the air by passing it over a cold surface.
4. An air conditioner cools your home with	d) a vapor-compression cycle similar to the one used by a refrigerator.
5. Refrigerating air for comfort inside the home,	e) the same operating principles and basic components as your home refrigerator.
6. The most common air conditioning systems use	f) all the electricity produced in the United States.
7. An air conditioner employs	g) what is known as a vapor-compression cycle similar to the one used by a refrigerator.
8. An air conditioner removes	h) a cold indoor coil called the evaporator.

Match the words with their definitions:

condense	to change or cause to change from a liquid or solid state to a vapour
air	a recurring period of time in which certain events or phenomena occur and reach completion or repeat themselves in a regular sequence
refrigerator	the act of compressing or the condition of being compressed
compression	the mixture of gases that forms the earth's atmosphere.
cycle	to increase the density of; compress
employ	a chamber in which food, drink, etc., are kept cool
coil	to provide work or occupation for; keep busy; occupy
evaporate	something wound in a connected series of loops

### Text 3 'Ventilation'

#### Vocabulary

means - средства

airtight - герметичный, воздухонепроницаемый

seal - зд. накапливать

moisture - влага

energy-efficient home - энергосберегающий, с низким энергопотреблением

exchange - обмен

odor - запах

contaminants - загрязняющие вещества

formaldehyde - формальдегид

volatile organic compounds - летучие органические соединения

radon - радон (эманация радия)

mold - growth рост плесени

air change - воздухообмен

vents - вентиляционные отверстия

duct system - система воздуховодов

spot ventilation - местная вентиляция

localized exhaust fan - локализованный вытяжной вентилятор

conjunction - сочетание

Ventilation – it is the process of moving air into and out of an interior space either by natural or mechanically induced (forced) means.

When creating an energy-efficient, airtight home through air sealing techniques, it's very important to consider ventilation. Unless properly ventilated, an airtight home can seal in indoor air pollutants. Ventilation also helps control moisture – another important consideration for a healthy, energy-efficient home.

#### Purpose of ventilation

Your home needs ventilation – the exchange of indoor air with outdoor air – to reduce indoor pollutants, moisture, and odors. Contaminants such as formaldehyde, volatile organic compounds, and radon can accumulate in poorly ventilated homes, causing health problems. Excess moisture in a home can generate high humidity levels. High humidity levels can lead to mold growth and structural damage to your home.

To ensure adequate ventilation, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) says that a home's living area should be ventilated at a rate of 0.35 air changes per hour or 15 cubic feet per person, whichever is greater.

#### Ventilation strategies

There are three basic ventilation strategies:



### Natural ventilation

Uncontrolled air movement into a home through cracks, small holes, and vents, such as windows and doors. Not recommended for tightly sealed homes.

### Whole-house ventilation

Controlled air movement using one or more fans and duct systems.

### Spot ventilation

Controlled air movement using localized exhaust fans to quickly remove pollutants and moisture at their source. Typically used in conjunction with one of the other strategies.

### Questions:

1. What is the ventilation?
2. Is it important to use ventilation?
3. What is the purpose of ventilation?
4. What are the ventilation strategies?
5. What is the most popular ventilation?

### Match the words with their definitions:

exchange	the act of joining together; combination; union
odor	a geographical area that is restricted in extent
contaminants	the property of a substance that gives it a characteristic scent or smell
mold	to give up, part with, or transfer (one thing) for an equivalent
duct	a pollutant
spot	a coating or discoloration caused by various saprotrophic fungi that develop in a damp atmosphere on the surface of stored food, fabrics, wallpaper, etc
conjunction	a tube, pipe, or canal by means of which a substance, esp a fluid or gas, is conveyed

## Text 4 'Natural ventilation'

### Vocabulary

distribution - распределение

alter - изменять

pattern - схема

adequate - соответствующий

infiltration - проникновение

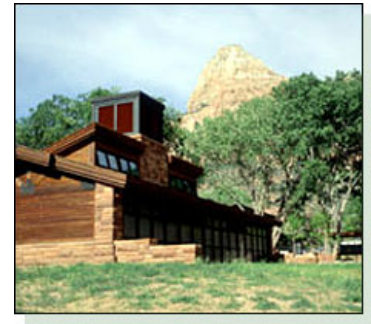
mode - режим, метод

rate - скорость, степень

uniformly - равномерно

airtightness - герметичность

Ventilation that is created by the differences in the distribution of air pressures around a building. Air moves from areas of high pressure to areas of low pressure with gravity and wind pressure affecting the airflow. The placement and control of doors and windows alters natural ventilation patterns.



Natural ventilation used to be the most common ventilation method of allowing fresh outdoor air to replace indoor air in a home. Today it is usually not the best ventilation strategy, especially for homes that are properly air sealed for energy efficiency. Natural ventilation also usually doesn't provide adequate moisture control.

Natural ventilation occurs when there is uncontrolled air movement or infiltration through cracks and small holes in a home – the same ones you want to seal to make your home more energy efficient. Opening windows and doors also provides natural ventilation. Because of central heating and cooling systems, however, most people don't open windows and doors as often. Therefore, air infiltration has become the principal mode of natural ventilation in homes.

A home's natural ventilation rate is unpredictable and uncontrollable – you can't rely on it to ventilate a house uniformly. Natural ventilation depends on a home's airtightness, outdoor temperatures, wind, and other factors. Therefore, during mild weather, some homes may lack sufficient natural ventilation for pollutant removal. Tightly sealed or built homes may have insufficient natural ventilation most of the time, while homes with high air infiltration rates may experience high energy costs.

Spot ventilation can be used to improve the effectiveness of natural ventilation. However, if both spot and natural ventilation together don't meet your home's ventilation needs, then you should consider a whole-house ventilation strategy.

True or false:

1. Ventilation that is created by the similarity in the distribution of air pressures around a building. ( )
2. Natural ventilation is the most common ventilation method. ( )
3. Natural ventilation occurs when there is uncontrolled air movement or infiltration through special holes in a home. ( )
4. You can't rely on natural ventilation to ventilate a house uniformly. ( )
5. Natural ventilation depends on a wind. ( )
6. Tightly sealed or built homes may have insufficient natural ventilation most of the time.
7. Spot ventilation can be used to improve the effectiveness of natural ventilation. ( )

8. If both spot and natural ventilation together don't meet your home's ventilation needs, then you should consider a whole-house ventilation strategy. ( )

## Text 5 'Window fan'

### Vocabulary

fan - вентилятор

cooling - охлаждение

facing away - находящийся в противоположной стороне

prevailing wind - господствующий ветер

exhausting hot air - изнурительный горячий воздух

tightly - плотно

windward side - наветренная сторона

independently - независимо, самостоятельно

layout - план, схема, расположение

pull - прогонять

assure - гарантировать, обеспечивать

Window fans use little energy and can provide effective cooling in many climates. Window fans are best used in windows facing away from the prevailing wind and exhausting hot air from your home. To cool as much of your home as possible, tightly close windows near the fan and open windows in rooms far from the fan, preferably on the windward side of your home. Windows near cooler, shaded outdoor areas provide the best intake air.



In multi-level houses, the fan should be located on the upper level, if possible, and the open windows should be located on a lower level. If that's not practical, you may want to independently ventilate each level of your home with separate fans.

Depending on the layout of your home, you might want to use several window fans working together to pull the air through your home. For instance, fans in several upstairs bedrooms will assure that each bedroom is cooled, and will work together to pull air in through the rest of your home.

### Questions:

1. What are advantages of using a fan?
2. How many fans you can use in multi-level houses?
3. What are the rules for installing a fan?
4. What you should do with the windows that are near the fan?
5. What is the best position for installing a fan?

Match the words with their definitions:

fan	a line or surface that borders anything
energy	a thing or a quantity taken in
wind	to screen or protect from heat, light, view, etc
side	any device for creating a current of air by movement of a surface or number of surfaces, esp a rotating device consisting of a number of blades attached to a central hub
shade	intensity or vitality of action or expression
intake	a current of air, sometimes of considerable force, moving generally horizontally from areas of high pressure to areas of low pressure

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