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КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

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TECHNOLOGY OF MACHINE DESIGN

*Допущено
Учебно-методическим объединением
вузов по образованию в области
автоматизированного машиностроения (УМО АМ)
в качестве учебного пособия для студентов
высших учебных заведений,
обучающихся по направлению подготовки
«Конструкторско-технологическое обеспечение
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Учебное пособие по изучению английского языка предназначено для студентов, обучающихся по специальности «Конструкторско-технологическое обеспечение машиностроительных производств», и широкого круга интересующихся вопросами в данной сфере. Пособие ставит своей целью обучить студентов понимать и переводить специализированную литературу и состоит из текстов на английском языке, заданий к ним, тестов и упражнений, ориентированных на изучение технического языка.

Большое внимание уделяется работе над лексикой, повторению знакомых, введению и закреплению новых слов, необходимых для чтения спецтекстов.

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ВВЕДЕНИЕ

Настоящее пособие предназначено для студентов и магистрантов высших технических учебных заведений, обучающихся по направлению подготовки «Конструкторско-технологическое обеспечение машиностроительных производств» и продолжающих изучение английского языка на базе знаний, приобретенных в средней школе и на первых курсах обучения в вузе.

Основная задача пособия состоит в обучении студентов понимать англоязычную специальную техническую литературу. Для достижения этой цели студенты должны приобрести определенный запас слов и изучить грамматический строй языка. Пособие также ставит своей целью помочь студентам овладеть навыками общения в трех видах речевой деятельности: чтении, говорении и письме.

Пособие состоит из четырех частей, логика и последовательность которых обусловлена материалом программы направления «Конструкторско-технологическое обеспечение машиностроительных производств».

Части состоят из следующих разделов:

1. Pronunciation and Vocabulary Exercises. В данный раздел входят группы предтекстовых упражнений, направленные на повторение и узнавание символов фонетической транскрипции и тренировку уверенного воспроизведения обозначаемых ими звуков и их сочетаний, а также на тренировку правил словообразования. Слова, предлагаемые в упражнениях данного раздела, частью уже хорошо знакомы студентам со школы, частью новые, появляющиеся затем в текстах второго раздела. Особенно важные из них систематизированы по частям речи.

2. Reading and Comprehension Exercises. В данный раздел входят упражнения, нацеленные, прежде всего, на усвоение специальной технической лексики. Здесь представлен большой объем текстового материала, который используется для обучения различным видам чтения (изучающее, поисковое, просмотровое), а затем – в послетекстовых упражнениях – служит основой для словарной работы.

Аутентичные тексты, составившие пособие, почти не подвергались адаптации и упрощению и взяты, по большей части, из статей Википедии.

3. Grammar Exercises. В данный раздел входят упражнения, направленные как на повторение и отработку уже известных грамматических явлений английского языка, так и на освоение и усвоение нового материала, особенно важного для точного понимания и перевода специальных технических текстов, – инфинитива и инфинитивных конструкций. Изучению последних, соответственно, уделяется больше внимания, и отработке каждого явления предшествует правило-напоминание особенностей его употребления и особенностей его перевода на русский язык.

4. Speech (and Writing) Exercises. Упражнения этого раздела направлены на стимулирование устного или письменного связного, последовательного и логически-стройного высказывания как на темы, связанные с изучаемой специальностью, так и на разнообразные темы бытового общения разного уровня официальности. Материал, представленный в текстах и упражнениях данного раздела, является источником общих, технических и страноведческих знаний.

В конце пособия приведены тексты по специальности, предназначенные для самостоятельной практики перевода.

Авторы будут признательны всем преподавателям и студентам за замечания и советы, которые помогут улучшить учебное пособие.

UNIT ONE

MECHANICAL ENGINEERING: AN INTRODUCTION

PRONUNCIATION AND VOCABULARY EXERCISES

Exercise 1. Read the following words. Pay attention to the pronunciation of the long and short vowels. Can you give two examples of words with the same vowel?

- [i] sit, regret, become, event, market, pocket, money, list, ship, principle, equipment, physics, civil, scheme, typical, fixed, cylinder, predict, system
- [i:] speak, reason, breathe, fatigue, machining, field, heat, unique, discrete
- [e] entrance, said, breath, electrical, chemical, sense, effect, extend, direct
- [ə] doctor, butter, answer, perhaps, permit, affair, sentence, total, assembly
- [ɑ:] term, turn, first, third, world, emerge, Tver, concerned, pertinent, early
- [ɑ:] shaft, branch, plant, draft, part, large, last, pass, plant, ask, chance, after
- [^] company, London, result, other, study, muscle, cutting, blood, one, month
- [æ] mechanical, static, analysis, matter, accuracy, lavender, Latin, thank
- [o] offhand, product, evolve, composite, body, optical, concept, hostel
- [o:] hydraulic, incorporate, thought, force, deform, cause, drawing, lord
- [u] would, foot, pull, full, look, cook, book, stood
- [u:] tool, include, move, root, fool, lose, cool, wound, boot, choose, through
- [ju:] pursue, usage, assume, human, movement, value, execute, Europe, union

Exercise 2. Look at the common noun suffixes. Use the suffixes to make nouns from the words in the table. Can you give more word examples?

<i>-ation</i>	to invite, to explain, to educate, to implement, to employ
<i>-ion</i>	to discuss, to decide, to compete, to complete
<i>-ness</i>	happy, weak, forgetful, dark, bright, cold, fair, rude
<i>-hood</i>	a brother, a child, a neighbour, a man
<i>-ship</i>	a friend, a leader, a member, an apprentice, hard, a dictator
<i>-ity</i>	flexible, productive, cruel, active, authentic, facile, extreme, fragile
<i>-ence</i>	to compete, to confer, to prefer, to insist, to infer
<i>-ment</i>	to govern, to develop, to enjoy, to improve, to advance, to punish,
<i>-dom</i>	a king, a duke, an earl, free, wise, a bore
<i>-ism</i>	to criticize, a journal, a hero, Buddha, a material, a symbol
<i>-al</i>	to arrive, to survive, to remove, to refuse
<i>-th</i>	wide, to grow, to steal, strong, long
<i>-er / -or</i>	to employ, to act, to sail, to supervise, to work, to impersonate
<i>-ian</i>	politics, music, Russia, history, library
<i>-ee</i>	to employ, to address, to pay, to train

Exercise 3. Look at the common verb suffixes. Use the suffixes to make verbs from the words in the table. Can you give more word examples?

–en	damp, ripe, hard, sharp, straight, loose, threat, wide
–ise / –ize	popular, a context, an emphasis, familiar, general, sympathy
–ify	exemplar, organ, active

Exercise 4. Here are some words that you will come across in the texts of the unit. Study them carefully. The pronunciation of the most difficult is given in the exercises above.

verbs		nouns	
apply	применять к (чему-л.); использовать, употреблять	advancement	продвижение, улучшение, развитие
assume	предполагать, допускать	amount	величина, количество, итог, результат, сумма
define	определять, давать характеристику	assembly	сборочный конвейер
determine	определить, установить	line	центр;
devote (to)	посвящать (себя) (чему-л.)	core	сердцевина, ядро
emerge	возникать, появляться	labo(u)r	труд
ignore	игнорировать	maintenance	содержание и техническое обслуживание, уход
insure	обеспечивать, гарантировать	matter	материя; вещество, материал
involve	включать в себя	means	средство, способ
occur	случаться, происходить	plant	завод, фабрика
overlap	частично совпадать	range	диапазон
predict	предсказывать	schematic	схема, диаграмма
pursue	заниматься (чем-л.)	tool	орудие (производства), инструмент
require	требовать		
run	работать (о машине)		
trace back	прослеживаться, восходить к определенному периоду в прошлом		
preposition		adjective and participle	
either ... or	или ... или	pertinent	уместный
		concerned with	связанный с (чем-л.)

READING AND COMPREHENSION EXERCISES

Exercise 1. Read the following text and translate it. Can you understand the terms in bold without a dictionary? What are their Russian equivalents?

1. **Mechanical engineering** is a discipline of **engineering** that applies the principles of **physics** and **materials science** for analysis, design, manufacturing, and maintenance of mechanical systems. It is the branch of engineering that involves the production and usage of heat and mechanical power for the design, production, and operation of machines and tools. It is one of the oldest and broadest **engineering disciplines**.

2. The engineering field requires an understanding of core concepts including **mechanics**, **kinematics**, **thermodynamics**, materials science, and **structural analysis**. Mechanical engineers use these core principles along with tools like **computer-aided engineering** and **product lifecycle management** to design and analyze manufacturing plants, industrial equipment and machinery, **heating and cooling systems**, **transport systems**, **aircraft**, **watercraft**, **robotics**, **medical devices** and more.

3. Mechanical engineering emerged as a field during the **industrial revolution** in Europe in the 18th century; however, its development can be traced back several thousand years around the world. **Mechanical engineering science** emerged in the 19th century as a result of developments in the field of physics. The field has continually evolved to incorporate advancements in technology, and mechanical engineers today are pursuing developments in such fields as **composites**, **mechatronics**, and **nanotechnology**. Mechanical engineering overlaps with **aerospace engineering**, **civil engineering**, **electrical engineering**, **petroleum engineering**, and **chemical engineering** to varying amounts.

Exercise 2. Answer the following questions about the text.

1. What is mechanical engineering?
2. What does mechanical engineering involve?
3. What are the objectives and goals of mechanical engineering?
4. Mechanical engineering requires an understanding of core concepts including mechanics, kinematics, thermodynamics, materials science, and structural analysis, doesn't it?
5. Does mechanical engineering use tools like computer-aided engineering or product lifecycle management?
6. How long back can its development be traced?
7. Did mechanical engineering science emerge in the 18th or 19th century?
8. Why is mechanical engineering one of the broadest engineering disciplines?

Exercise 3. Complete the sentences with the information from the text.

1. Mechanical engineering is a discipline of ... that applies the principles of ... and ... for ... of mechanical systems.
2. The engineering field requires an understanding of core concepts including
3. Mechanical engineers use tools like
4. The target of mechanical engineers is the design and analysis of ... and more.
5. Mechanical engineering emerged as a field in
6. Mechanical engineering science emerged in
7. Mechanical engineers today are pursuing developments in such fields as
8. Mechanical engineering overlaps with

Exercise 4. Select the number (1, 2, 3) of the paragraph which gives the information about:

1. the core concepts of (mechanical) engineering;
2. the history of mechanical engineering and mechanical engineering science;
3. the disciplines with which mechanical engineering overlaps.

Exercise 5. Read the following text and translate it.

The field of mechanical engineering can be thought of as a collection of many mechanical engineering science disciplines. Some of these subdisciplines are unique to mechanical engineering, while others are a combination of mechanical engineering and one or more other disciplines.

Mechanics is, in the most general sense, the study of forces and their effect upon matter. Typically, engineering mechanics is used to analyze and predict the acceleration and deformation of objects under known forces (also called loads) or stresses. Subdisciplines of mechanics include Statics, the study of how forces affect static bodies; Dynamics (or kinetics), the study of how forces affect moving bodies; Mechanics of materials, the study of how different materials deform under various types of stress; Fluid mechanics, the study of how fluids react to forces; Continuum mechanics, a method of applying mechanics that assumes that objects are continuous (rather than discrete).

Mechanical engineers typically use mechanics in the design or analysis phases of engineering.

Kinematics is the study of the motion of bodies (objects) and systems (groups of objects), while ignoring the forces that cause the motion. Mechanical engineers typically use kinematics in the design and analysis of mechanisms.

Mechatronics is an interdisciplinary branch of mechanical engineering, electrical engineering and software engineering that is concerned with integrat-

ing electrical and mechanical engineering to create hybrid systems. A common example of a mechatronics system is a CD-ROM drive. Mechanical systems open and close the drive, spin the CD and move the laser, while an optical system reads the data on the CD and converts it to bits. Integrated software controls the process and communicates the contents of the CD to the computer.

Robotics is the application of mechatronics to create robots, which are often used in industry to perform tasks that are dangerous, unpleasant, or repetitive. These robots may be of any shape and size, but all are preprogrammed and interact physically with the world. To create a robot, an engineer typically employs kinematics (to determine the robot's range of motion) and mechanics (to determine the stresses within the robot).

Robots are used extensively in industrial engineering. They allow businesses to save money on labor, perform tasks that are either too dangerous or too precise for humans to perform them economically, and to insure better quality. Many companies employ assembly lines of robots, especially in Automotive Industries and some factories are so robotized that they can run by themselves. Outside the factory, robots have been employed in bomb disposal, space exploration, and many other fields.

Structural analysis is the branch of mechanical engineering (and also civil engineering) devoted to examining why and how objects fail and to fix the objects and their performance. Failure is not simply defined as when a part breaks, however; it is defined as when a part does not operate as intended. Some systems, such as the perforated top sections of some plastic bags, are designed to break. If these systems do not break, failure analysis might be employed to determine the cause.

Structural analysis is often used by mechanical engineers after a failure has occurred, or when designing to prevent failure.

Thermodynamics is an applied science used in several branches of engineering, including mechanical and chemical engineering. At its simplest, thermodynamics is the study of energy, its use and transformation through a system. Typically, engineering thermodynamics is concerned with changing energy from one form to another.

Drafting or technical drawing is the means by which mechanical engineers design products and create instructions for manufacturing parts. A technical drawing can be a computer model or hand-drawn schematic showing all the dimensions necessary to manufacture a part, as well as assembly notes, a list of required materials, and other pertinent information. Drafting is used in nearly every subdiscipline of mechanical engineering, and by many other branches of engineering and architecture.

Exercise 6. Match the terms from the text and their Russian equivalents.

statics	робототехника
dynamics	мехатроника
mechanics of materials	гидромеханика
fluid mechanics	кинематика точки
kinematics	инженерия программного обеспечения
continuum mechanics	промышленная инженерия
mechatronics	конвейер
electrical engineering	черчение
software engineering	термодинамика
robotics	сопротивление материалов
industrial engineering	химическая технология
assembly line	статика
thermodynamics	динамика
chemical engineering	механика сплошных сред
drafting	электротехника

Exercise 7. Find in the text the English equivalents of the following Russian words and phrases.

Область машиностроения; совокупность многих научных дисциплин машиностроения; статические тела; движущиеся тела; междисциплинарная отрасль; гибридные системы; запрограммированный; предприятия; сэкономить на трудозатратах; экономически; гарантировать лучшее качество; обезвреживание взрывных устройств; космические исследования; посвященный кому- или чему-либо; должным образом (как предполагалось); перфорированные верхние секции; определить причину; предотвратить отказ оборудования (избежать неудачи); прикладная наука; в самом простом понимании; как правило; начерченная от руки схема; заметки по сборке; перечень необходимых материалов; соответствующая информация.

Exercise 8. Find in the text the following English words and phrases and give their Russian equivalents.

Unique to mechanical engineering; the study of forces and their effect upon matter; to analyze and predict; under known forces (also called loads); the study of how forces affect static bodies; the study of how fluids react to forces; continuous (rather than discrete); a common example of; converts the data to bits; communicates the contents of the CD to the computer; allow businesses to save money on labor; either too dangerous or too precise; assembly lines of robots; does not operate as intended; designed to break; failure analysis; through a sys-

tem; a computer model; hand-drawn schematic; required materials; used in nearly every subdiscipline of mechanical engineering.

Exercise 9. Complete the sentences with the information from the text.

1. The field of mechanical engineering can be thought of as a collection of
2. Some of these subdisciplines are unique to mechanical engineering, but others are
3. ... is, in the most general sense, the study of forces and their effect upon matter.
4. Subdisciplines of mechanics include
5. Mechanical engineers typically use kinematics in
6. Mechatronics is concerned with integrating electrical and mechanical engineering to
7. Robotics is the application of ... to create robots.
8. To create a robot, an engineer typically employs kinematics in order to ... and mechanics in order to
9. Some factories are so robotized that they can
10. ... is the branch of mechanical engineering that examines why and how objects fail and how to fix the objects and their performance.
11. At its simplest, thermodynamics is the study of ... , its use and transformation through a system.
12. Drafting or ... is the means by which mechanical engineers design products and create instructions for manufacturing parts.
13. A technical drawing is a computer model or hand-drawn schematic showing all the dimensions necessary to
14. Drafting is used in

Exercise 10. Re-read the text and say if the following statements are:

- true
- false
- of no information in the text.

1. Mechanical engineering is a set of several disciplines.
2. Statics is the study of non-moving bodies under known loads.
3. Kinematics is the study of the motion of bodies and systems, taking into account the forces that cause the motion.
4. Mechatronics is a subdiscipline unique to mechanical engineering.
5. Robots are also sold for various residential applications.
6. Structural analysis may be used in the office when designing parts, in the field to analyze failed parts, or in laboratories where parts might undergo controlled failure tests.

7. At its simplest, thermodynamics is the study of speed, its use and transformation through a system.
8. Drafting is an important aspect of mechanical engineering, and of many other branches of engineering and architecture.

Exercise 11. Read the text again and think of a title for it.

GRAMMAR EXERCISES

Exercise 1. Form the comparative and superlative of each adjective. Pronounce them accurately. Translate them into Russian.

Small, hot, dry, cold, interesting, wet, noisy, exciting, near, big, good, beautiful, far, old, busy, little, bad, healthy, amazing, long, intelligent, poor, sad

Exercise 2. Analyze the following sentences and identify the comparative constructions used in them.

1. English is easier to learn than Japanese.
2. You must do your homework more carefully.
3. It was the most difficult decision I ever had to make.
4. I am younger than you. I am the youngest in my family.
5. Buses aren't as fast as trains.
6. The eastern side of the British Isles has a drier climate.
7. Computers are becoming more and more complicated.
8. The oldest known dam, an engineering wonder of the ancient world, lies near Marib, once the home of the Queen of Sheba.
9. Mice aren't really as attracted to cheese as they are to grains.
10. The more technical today's world becomes, the more compatible with both humans and machines language needs to be.
11. How has Jimmy behaved himself? – He's been as good as gold.
12. I was more than pleased with my pay rise. I was over the moon.

Exercise 3. Find an error in each of the following sentences and correct it.

1. He is more older than he looks.
2. Jessica's as tall than her mother.
3. Trains in London are more crowded that in Paris.
4. Oxford is one of oldest universities in Europe.
5. He's as intelligent than his sister.
6. This is more hard than I expected.
7. Who is the most rich man in the world?
8. Everything is more cheap in my country.

Exercise 4. Complete the sentences with the suitable comparative constructions: *(not) as ... as, than ...* .

Melbourne was interesting, but for me, Paris was _____ interesting _____ Melbourne, and in some ways Dubai was the _____ interesting of all because it was so different _____ any other place I know. It was also the _____ driest, and _____ modern. It was hot in Melbourne but not as _____ hot _____ in Dubai. Dubai was _____ hotter! Melbourne is _____ older _____ Dubai but not _____ old _____ Paris. Paris was _____ oldest city I visited, but it has some great modern buildings, too. It was the _____ romantic place. I loved it.

Exercise 5. Rewrite the following sentences in the passive.

1. Who invented the telephone?
2. We can think of the field of mechanical engineering as a collection of many mechanical engineering science disciplines.
3. When will they hold the annual dance?
4. People use robots extensively in industrial engineering.
5. Outside the factory, people have employed robots in bomb disposal, space exploration, and many other fields.
6. The fire damaged many buildings in the city centre.
7. They will dedicate the new university building to Dr Potters.
8. We define failure not simply as when a part breaks, however; we define it as when a part does not operate as intended.
9. Mechanical engineers design some systems, such as the perforated top sections of some plastic bags, to break.
10. Dora sold three sculptures at the gallery opening.
11. They will open the library to the public in September.

Exercise 6. Translate the sentences.

1. The delegation was headed by the Minister of Foreign Affairs.
2. The development of mechanical engineering can be traced back several thousand years around the world.
3. She can be seen in the library every day.
4. Engineering mechanics is used to analyze and predict the behavior of objects under loads and stresses.
5. Heat and light are given to us by the sun.
6. The children were brought up in the country.
7. Robots are often used in industry to perform tasks that are dangerous, unpleasant, or repetitive.

8. Some factories are so robotized that they can run by themselves.
9. He was educated in Oxford.
10. The guests were shown the places of interest in the city.
11. She is invited to come to England next year.

Exercise 7. Translate the sentences paying attention to modal verbs and their substitutes.

1. The field of mechanical engineering can be thought of as a collection of many mechanical engineering science disciplines.
2. She could read when she was three.
3. I must excuse myself.
4. Robots may be of any shape and size.
5. May I use your telephone?
6. Jack shouldn't laugh at Tom.
7. I think you should write and apologize.
8. John ought to be more careful in the future.
9. You needn't buy bread. We have some at home.
10. I have to take a taxi in order not to be late.
11. We had to wait because the manager was out.
12. Robert is to take his exams next month.
13. We are to meet at 5 o'clock.
14. Were you to read *Oliver Twist* at school?

Exercise 8. Here are some common question words. Translate them and match them with their answers.

Where?	Just because.
Who?	To see the manager.
When?	Very nice.
Why?	Last week.
Whose?	Ten pounds.
Which?	At home.
How long?	Two years.
How much?	In ten days.
How many?	Medium.
How soon?	Circular.
How old?	A dozen.
What ... like?	Mine.
What ... for?	Jane.
What shape?	Ten.
What size?	This one.

Exercise 9. Make questions to the words given in italics.

1. *Mechanical engineering* is a discipline of engineering.
2. Mechanical engineering emerged as a field during the industrial revolution in Europe *in the 18th century*.
3. Mechanics is, in the most general sense, *the study of forces and their effect upon matter*.
4. Mechanical engineers typically use kinematics *in the design and analysis of mechanisms*.
5. Robots may be *of any shape and size*.
6. The capital of Great Britain is *London*.
7. Old St. Paul's Cathedral was built *during Norman times*.
8. The cathedral *that replaced it* was designed by Sir Christopher Wren.
9. The town of Tver stands *on the great Russian river Volga*.
10. *In the second part of the 19th century* Tver became a large industrial town.

Exercise 10. Choose the correct variant of the tag.

1. The field of mechanical engineering can be thought of as a collection of many mechanical engineering science disciplines, **can it / can't it?**
2. To create a robot, an engineer typically employs kinematics and mechanics, **does not he / doesn't he?**
3. Robots are used extensively in industrial engineering, **aren't they / didn't they?**
4. Outside the factory, robots have been employed in bomb disposal, space exploration, and many other fields, **haven't they / haven't been they?**
5. At its simplest, thermodynamics is the study of energy, its use and transformation through a system, **is not it / is it not?**
6. A technical drawing can be a computer model or hand-drawn schematic, **can't it / can it?**
7. In the Port of London there are miles and miles of docks, **aren't there / aren't they?**
8. This is the East of London, unattractive in appearance, but very important to the country's commerce, **is it / isn't it?**
9. The name *West End* came to be associated with wealth, luxury, and goods of high quality, **didn't it / wasn't it?**
10. Many famous Russian poets and writers came to Tver many times, **didn't they / weren't they?**
11. There are many educational establishments in our town, **aren't they / aren't there?**
12. The Tver Gorky Regional Library was founded one hundred years ago, **was it not / was not it?**

Exercise 11. Give the five types of questions for each of the following sentences.

1. Structural failures occur in two general modes: static failure, and fatigue failure.
2. The population of London is probably the most cosmopolitan in the world.
3. The best architects of Russia A. V. Kvasov and M. F. Kazakov worked up the town development plan.

Exercise 12. Translate the sentences paying attention to the infinitive form and function.

форма инфинитива	залог		смысл
	Active	Passive	
Simple	to V ₁ <i>to write</i>	to be V ₃ <i>to be written</i>	Действие, выраженное инфинитивом, происходит одновременно со сказуемым или будет происходить в будущем .
Continuous	to be Ving <i>to be writing</i>	to be being V ₃ <i>to be being written</i>	Действие инфинитива происходит в тот момент , о котором говорится в предложении.
Perfect	to have V ₃ <i>to have written</i>	to have been V ₃ <i>to have been written</i>	Действие инфинитива происходит раньше действия сказуемого.
Perfect Continuous	to have been Ving <i>to have been writing</i>	to have been being V ₃ <i>to have been being written*</i>	Действие инфинитива началось раньше действия сказуемого, но всё еще длится в момент указанный в предложении.

* Употребляется редко.

Инфинитив может играть роль любого члена предложения.

1. **Инфинитив как подлежащее или сказуемое** может переводиться неопределенной формой глагола или существительным.

To live is to study. – Жить значит учиться. Жизнь – это учеба.

2. **Инфинитив как дополнение** (стоит после сказуемого) переводится неопределенной формой глагола.

Learn to walk before you run. – *Научитесь ходить, прежде чем побежать.*

3. **Инфинитив как обстоятельство** (цели или следствия) переводится неопределенной формой глагола с союзами *для того чтобы* или *чтобы*.

To live long it is necessary to live slowly (M. T. Cicero). – *Чтобы жить долго, надо жить не торопясь* (Цицерон).

Some people are too proud to admit that they don't know. – *Некоторые люди слишком горды, чтобы допустить, что они (чего-то) не знают.*

4. **Инфинитив как определение** переводится придаточным предложением, вводимым союзом *который*. Инфинитив в форме Simple можно переводить сказуемым в будущем времени и даже со словами *должен, нужно, можно*.

The plans to be reconsidered are in the top drawer. – *Планы, которые нужно пересмотреть, лежат в верхнем ящике стола.*

He was the first to realize the difficulty of the situation. – *Он был первым, кто осознал трудность положения.*

- | | | |
|--------------|---|--|
| 1. I am glad | { | to speak to you.
to be speaking to you.
to have spoken to you.
to have been speaking to you for a long time.
to be told the news.
to have been told the news. |
|--------------|---|--|

2. I remember to have been told a lot about these rules, but I failed the main point of them.

3. Mechanical engineers use the core principles of mechanics, kinematics, thermodynamics, etc. to design and analyze manufacturing plants, industrial equipment and machinery, transport systems, aircraft, watercraft, robotics, etc.

4. I am sorry to have kept you waiting so long.

5. To construct an experiment of this kind seems nearly impossible.

6. No one likes to be scolded for nothing. What is to be done to improve the situation?

7. To survive in the frozen wastes of Antarctica takes special equipment.

8. Mechanical engineering science has continually evolved to incorporate advancements in technology.

9. In the 18th century Catherine the Great sent a group of architects headed by P. R. Nikitin to restore the town after two great fires.

10. The tests are to be followed by data processing. Care is to be taken to prevent failure.

11. I am very happy to have had the pleasure of making your acquaintance.

12. He always has money to spend.
13. He was the last person to do business with.
14. A U. S. mechanical engineer to create technical drawings is called a drafter or draftsman.
15. On the left bank of the Volga River we can also see the monument to the Tver merchant Afanasy Nikitin who was the first to visit India.
16. Our scientist were the first to synthesize diamonds.
17. Marie Curie was the first scientist to win two Nobel Prizes in science.
18. Industrial robots grasp and manipulate objects that are too dangerous for humans to handle.
19. The dog Laika was the first living creature to fly in the artificial satellite.
20. He was too polite to make any personal remarks out loud.

SPEECH EXERCISES

GETTING TO KNOW YOU. THE PLACE WE LIVE IN. ENGLISH-SPEAKING COUNTIES. TVER. GIVING DIRECTIONS. TELEPHONING

Exercise 1.

a) Can you introduce yourself? Can you tell you partner what you name is, how old you are and when you were born, where you come from, where you live, how big your family is, if you have any sisters or brother, what your parents do, when you finished school, what university you go to, why you decided to enter Tver State Technical University, what you study, which year you are in now, if you have a job (a part-time job), what you want to do after you graduate.

b) Can you ask your partner questions to find out this information about him / her?

Exercise 2. Read the text about Maurizio and use it as a pattern to speak about yourself.

My name's Maurizio Celi. I come from Bologna, a city in the north of Italy. I'm a student at the University of Bologna. I'm studying modern languages – English and Russian. I also know a little Spanish, so I can speak four languages. I'm enjoying the course a lot, but it's really hard work. The course lasts three years, I'm in my second year now.

I live at home with my parents and my sister. She's three years my junior. My brother who is ten years my senior went to work in the United States last year.

In four years I shall graduate from the university and I'm going to work as a translator. I hope so, anyway.

Exercise 3. Complete the following conversations with the phrases from the boxes, say in what situations they are possible, learn them by heart and act them out. Pay attention to the expression in bold and translate them.

a)

Good to see you here again this is Let me introduce you to everyone
It's very nice to be here

Jerry Hello. _____ .
Frances _____ . How are you and your family?
Jerry Very well, thanks. How was the journey? Good flight?
Frances Not bad. But the food was terrible.
Jerry Oh, poor you! Ah... Here are the others. _____ . Frances, _____ Charlie... and I think you already know Benita, don't you?
Frances Yes, we met last year.
Benita I must say I love your dress, Frances.
Frances Thank you.
Charlie Anyway, the meeting starts at 2.00. Let's meet again at 1.30, shall we?
Frances Right. See you at 1.30 then.
Jerry **See you later.**

b)

No, I haven't had the pleasure I'm glad to meet you, too
Haven't you met her let me introduce you to her

Jim Who's the tall girl next to Barbara?
Charles That's Mary Anderson. _____ ?
Jim _____ .
Charles Oh, then _____ . Mary, **this is Jim, a friend from the University.**
Mary Hello, Jim, I'm glad to meet you.
Jim _____ . Can we sit down somewhere and talk?

c)

I'd like you to meet How do you do

Margaret Mr. Wilson, _____ Dr. Edward Smith.
Mr. Wilson _____ , Dr. Smith.
Margaret Dr. Smith is an economist. He's just finished writing a book on international trade.
Mr. Wilson Oh? That's my field too.

Exercise 4. Read the following short dialogues, try to reproduce them and then use them as a pattern to speak with your partner.

a)

Dick Hello, Kate. This is my friend, Ian Petrov.
Kate Hello, Jan. Glad to meet you. I'm Kate.
Ian Hello, Kate. How nice to meet you.

b)

Rob Excuse me, Julie, what's your friend's name?
Julie His name is Peter.
Rob Where is he from?
Julie He is from Sandovo. Why?
Rob You see, I'm from Sandovo too. Best regards to him.
Julie Shall I introduce you to him?
Rob Do, please.

c)

Margaret What is the name of your younger brother?
Paul Sasha.
Margaret Really? Fantastic, we both have a brother Sasha by name.
Paul Why? Sasha is such a popular name.

d)

Ann Look Jake, have you got a family of your own?
Jane Oh, no, I'm not married yet. I live with my parents.
Ann Is your family large?
Jane I don't think so. My parents have got only two daughters.
Ann And which of you is the eldest?
Jane It's me. I'm twenty.
Ann How old is your younger sister? I wonder what her name is?
Jane Susan. She's a lovely girl. She is ten.
Ann It's a pleasure to have such a young sister, isn't it?
Jane Certainly. She's the apple of my eye.

Exercise 5. Read the text. Remember different ways of addressing people in English.

There are several ways of addressing people in English. The most universal ones that can be used when speaking to strangers as well as to people you know are:

Mr. – to a man (Mr. Brown);

Mrs. – to a married woman (Mrs. Brown);

Miss – to an unmarried woman (Miss Brown);

Ms – to a woman whose marital status is unknown (mostly used in the written; Ms Brown).

These forms of address are never to be used without the person's family name.

People who have scientific degree – a PhD, ScD – are to be addressed *Dr.* (*doctor*) plus their surname (Dr. Brown), whereas doctors who cure people are simply *Doctors*, no name is necessary in this case. *Professors* can also be addressed by the title only. A school teacher is addressed *Miss* by the children in her class.

Sir and *Madame* are mostly used when speaking to the customers. You'd better use officer addressing a policeman, *Your Majesty* addressing a King or a Queen, *Ladies and Gentlemen* addressing a group of people.

In fact people in the English speaking countries prefer calling each other by their first name: *Peter, Ann*, etc.

Exercise 6. Study the chart carefully and complete it. How many groups of the nationality words can you identify?

country	adjective	a person	the nation
Japan	Japanese	a Japanese; two Japanese (<i>men</i>)	the Japanese
	Chinese		
Russia	Russian	a Russian; two Russians (<i>men</i>)	(the) Russians
Canada			
Africa	African	an African; two Africans (<i>men</i>)	(the) Africans
Germany	German	a German; two Germans (<i>men</i>)	(the) Germans
Greece	Greek	a Greek; two Greeks (<i>men</i>)	
Denmark	Danish	a Dane; two Danes (<i>men</i>)	(the) Danes / the Danish
	Finnish		(the) Finns / the Finnish
	Polish	a Pole; two Poles (<i>men</i>)	(the) Poles
England	English	an Englishman / -woman; two Englishmen / -women	the English / Englishmen

	French	a Frenchman /-woman; two Frenchmen / -women	
Ireland	Irish		
Wales	Welsh		
Britain	British	a Briton; Britons (<i>ra-</i> <i>re</i>); a Britisher (AmE)	the British; Britishers (AmE)
Scotland	Scottish	a Scot; a Scotsman / -woman; two Scotsmen / -women (and note <i>Scotch whis-</i> <i>ky</i>)	(the) Scots

Exercise 7. Read the text.

Well, first of all I'd like to say that entering the university in the capital was my first step into adult life. Certainly I was aware that my life would change a lot and that I would face some difficulties (among which was sharing a room with unknown people), but I decided that it was time to start a new adult life.

So now I live in a hostel and share my room with three boys. Frankly speaking during my first months in the hostel I felt like being in a health resort. I was free and it was like a breath of fresh air. But then I got used to it. Now it even seems to me as I have lived in the hostel for ages. When you live in a hostel you never feel lonely; here you always have somebody to turn for help, a piece of advice or just to talk to. I've acquired a lot of friends and acquaintances in the hostel, who will certainly lend me a hand if I need it. But sometimes living in a hostel annoys me, especially when some noise disturbs me and prevents me from work. I also want to admit that it's very difficult to live with people who have another rhythm of life. For example, I'm an early riser but all the other girls in our room like to sleep as long as possible and I can hardly do anything until they awake. Besides you need to adapt yourself to other people's desires and wishes and sometimes it's very difficult, because the first wants to listen to hard music, the second wants to learn something and the third wants to sleep; the only way out in such a situation is to find a compromise. We successfully find it, though it isn't very easy, and that's why there no quarrels and disagreements in our room.

But frankly speaking sometimes I dream of renting a flat. First of all, because you can do everything you want, you needn't adjust to other people and their habits, for instance, if you want to sleep (even at a daytime) nobody will hamper you, if you want to study something in silence you can easily do it.

And from time to time I think that it would be even better to live with parents. First of all, because home is home; it's your little world where you live according to your own rules and interests. It's a place where you feel comfort, warmth and reliability. There you have everything you need starting with meals your mother cooks every day and finishing with household appliances like iron, vacuum cleaner, TV set and computer. Also you have a room of your own where you can paper the walls according to your taste, arrange furniture as you like and do what you want.

Exercise 8. Read the text again and speak about yourself. Now, when you are a student, where do you live: do you go on living with you parents, or do you rent a flat (on your own or do you share it with some flat-mates?), or do you live in a hostel / dormitory? Do you like it or would you like to change your way of living? What are the advantages and disadvantages of living in a hostel, renting a flat or living with parents? Can you name any other possible ways of living of a student?

Exercise 9. Read the dialogue and be ready to retell it.

Vlad	Where do you live, Susan?
Susan	In a flat, near my university.
Vlad	How big is it?
Susan	Not very big. It's a two-room flat.
Vlad	And a kitchen and a bathroom?
Susan	Yes, of course.
Vlad	And what about the rooms? Are they big?
Susan	The living-room is, but the bedroom is a bit small. But it's O.K.
Vlad	Is it expensive?
Susan	No, it's quite cheap, really.
Vlad	And are you happy there?
Susan	Yes, I am, but it isn't perfect, you know.
Vlad	Oh, what's wrong with it then?
Susan	Well, there's a lot of traffic to the street outside, so it's a bit noisy.
Vlad	Is that all?
Susan	No, it's also a bit cold there, the heating isn't very good.
Vlad	Where would you really like to live?
Susan	I'd like to have a small cottage near the sea with an orange tree in the garden.
Vlad	Oh, dear, what a sweet dream.

Exercise 10. Complete the texts with the words from the boxes.

a)

exports	enjoy	immigrants	huge
---------	-------	------------	------

This country has quite a small population, just 16 million, but the country is _____. The people are mainly of European descent, but there are also aborigines and a lot of south-east Asian _____. People live in towns on the coast, not so much inland because it is so hot. They live a lot of their lives outdoors, and _____ sports, swimming, and having barbecues. This country _____ wine and wool – it has more than 60 million sheep!

b)

favourite	variety	has	only
-----------	---------	-----	------

This is the second biggest country in the world, but it has a population of _____ 30 million. It is so big that there is a _____ of climates. Most people live in the south because the north is too cold. It is famous for its beautiful mountains and lakes – it _____ more lakes than any other country. Their _____ sports are baseball and baseball and ice hockey.

c)

elephants	grows	black	climate
-----------	-------	-------	---------

This country has a population of about 45 million. Of these, 76 per cent are _____ and 12 per cent white. It has a warm _____. Either it never rains, or it rains a lot! It is the world's biggest producer of gold, and it exports diamonds, too. It _____ a lot of fruit, including oranges, pears, and grapes, and it makes wine. In the game reserves you can see a lot of wildlife, including lions, _____, zebras, and giraffes.

Exercise 11. Re-read the texts above and answer the questions.

1. What countries are described? What are the names of their capitals? What languages do the people living there speak?
2. What other English-speaking countries do you know? What are their capitals?
3. What do you know about the United Kingdom and the four parts it is made up of? Give as much information about them as possible.

Exercise 12. Complete the following statements about the English-speaking countries with the suitable word.

a)

The term of the _____ has a maximum duration of five years.

A Parliament of New Zealand

В United States Congress

Ошибка! Parliament of Australia

Ошибка

связи.

D British Parliament

b)

Wall Street, the symbol of the US financial power, is located in _____ .

A New York

В Los Angeles

Ошибка! Washington

Ошибка

связи.

D Chicago

c)

The floral symbol of Canada is the _____ .

A maple leaf

В thistle

Ошибка! rose

Ошибка

связи.

D trefoil

d)

An English writer, poet, philologist, and university professor, best known as the author of the classic fantasy works *The Hobbit*, *The Lord of the Rings* and *The Silmarillion*, is _____ .

A John Ronald Reuel Tolkien

В Geoffrey Chaucer

Ошибка! Charles John Huffam Dickens

Ошибка

связи.

D Walter Scott

e)

Thanksgiving Day is celebrated in the USA in _____ .

A July

B November

Ошибка! May

Ошибка

связи.

D August

f)

Gilles Vigneault's words "My country isn't a country, it's winter" are about _____ .

A Norway

B America

Ошибка! Iceland

Ошибка

связи.

D Canada

g)

A British politician known chiefly for his leadership of the United Kingdom during World War II is _____ .

A Franklin Delano Roosevelt

B Clement Richard Attlee

Ошибка! Sir Winston Leonard Spencer-Churchill

Ошибка

связи.

D James Gordon Brown

Exercise 13. Read the following text and try to fill in the missing words concerning Russia's wonders.

1. _____ is considered to be a more European capital than Moscow. The creation of Peter the Great, it is best known for its 18th- and 19th-century palaces; the Peter and Paul fortress, a former prison; the Hermitage Museum, and the White Nights.

2. _____ is a group of towns and cities around Moscow – including Suzdal, Vladimir, Yaroslavl, Kostroma and others. They offer a host of re-

stored and abandoned churches, monasteries and fortresses, rich museums and preserved wooden villages.

3. Set on the Black Sea coast against the backdrop of the snow-capped Caucasus mountains, the beach resort town _____ was for a long time the place to spend a vacation, with its subtropical climate, warm seas, arboretum and gardens. Most tourists visit this town to relax on the beaches, swim in the sea and partake of its favourable climate; but its mineral spas and sanatoriums make it an ideal health resort.

4. Areas of _____, which rise dramatically above the Black Sea coast and run down to the Caspian Sea, are also noted for their plant diversity, subalpine pastures grazed by wild animals and lack of human disturbance. Here, one can go skiing, scale Europe's highest peak – the 5,642-meter Mount Elbrus – and relax at the spas of Mineralniye Vody.

5. Travellers can visit _____ to see its hot springs and view its wildlife and spectacular sunsets. This, a more than 1,000-kilometer-long peninsula dividing the Sea of Okhotsk from the Pacific Ocean, is said to be one of the least explored regions on Earth. The most amazing attraction is the Valley of the Geysers in Kronotsky National Park, which was only discovered in the 1940s.

6. A holiday pursuit popular among Russians but rarely tried by foreigners is to take the pulse of the country by plying its main artery, _____. The 3,700-kilometer-long river winds its way past republics and cities with varied environments, religions and economies, but all of which hold the river as something central to their cultural heritage.

7. An impressive spectacle near the border of Russia and Mongolia, _____ is 636 kilometres long and 80 kilometres wide – and is the world's deepest lake. Surrounded by forests and mountain peaks, the waters are transparent to a depth of 40 meters in the summer, and freeze over so thick in the winter that the Trans-Siberian Railroad once ran over its surface.

Exercise 14. What do you remember about London? Make questions to fit the following answers about London.

1. On the river Thames.
2. The City, Westminster, the West End and the East End.
3. Banks, offices and firms, including the Bank of England, the Stock Exchange and the Old Bailey.
4. Big Ben.
5. Geoffrey Chaucer, Alfred Tennyson, Charles Dickens, Thomas Hardy, Rudyard Kipling, etc.
6. The West End.
7. In the memory of Admiral Nelson's victory at the battle of Trafalgar in 1805.
8. The National Gallery and the National Portrait Gallery.

9. Many factories and the Port of London.
10. Yes, it is.

Exercise 15. Read the following text about Tver.

The town of Tver stands on the great Russian River Volga. The town was known as Kalinin from 1931 to 1990. It is one of the oldest Russian towns. Tver was founded in 1135, so it is 12 years older than Moscow. In 1755 Tver became the principle town of the Tver province.

In the 18th century Catherine the Great sent a group of architects headed by P. R. Nikitin to restore the town after two great fires. The best architects of Russia A. V. Kvasov and M. F. Kasakov worked up the town development plan. The town planning was considered to be a height of a three-rayed architectural composition. It has been preserved to our days. Many beautiful buildings designed by them are examples of Russian architecture. These buildings are: the Travel Palace, a number of buildings in Octagonal Square and on the bank of the Volga River.

Many famous Russian poets and writers came to Tver many times. Some of them lived or stayed here for a long time: A. S. Pushkin, I. A. Krylov, M. Y. Saltykov-Shchedrin, L. N. Tolstoy, I. I. Lazhechnikov. Monuments to all these people were erected in our town. On the left bank of the Volga River we can also see the monument to the Tver merchant Afanasy Nikitin who was the first to visit India.

In the second part of the 19th century Tver became a large industrial town. Here appeared large textile mills, a steam mill, a timber mill and a railway carriage building plant. Now Tver is a big industrial and administrative center of Tver Region. There are many large enterprises of engineering, metal working, textile, chemical, polygraphical and other industries: a printing combine which publishes text-books and magazines, a larger combine of children books, an excavator works, an artificial fibre combine and an artificial leather combine.

Tver is also a big cultural centre of our country. Its Drama Theatre, Philharmonic Society, Children's Theatre were built after the war. Tver has many cinemas, clubs, palaces of culture, a television centre and many libraries. The Gorky Regional Library was founded one hundred and fifty years ago (1860). It has over 600,000 books. Now it is a center of scientific research.

There are many educational establishments in our town. Among them are State University, Technical University, State Medical Academy and Agricultural Academy.

The country around Tver is very picturesque. The town of Tver grows and becomes more beautiful from year to year. Its old history, advantageous geographical location between the two Russian capitals, rich nature, developed in-

dustry, intellectual, scientific and cultural potential are sure to attract tourists to the Tver Region.

Exercise 16. Read the words with right pronunciation and stress.

Tver Province, provincial, architecture, Octagonal Square, embankment, monument, large textile mills, railway carriage building plant, enterprise, printing and publishing combine, artificial fibre and leather combines, industry, scientific, Drama Theatre, Philharmonic Society, picturesque, tourist.

Exercise 17. Re-read the text, answer the following questions.

1. Where does the town of Tver stand?
2. When was Tver founded?
3. Is Tver older than Moscow?
4. What role did Tver play in the history of our country in the past? And now?
5. By whom was the centre of the city designed?
6. What are the full names of the famous Russian architects Nikitin, Kvasov and Kazakov?
7. What buildings were built by these architects in Tver?
8. Can you name at least one architectural design outside Tver each of these architects is famous for?
9. Which Tver square and three Tver streets form the famous three-rayed architectural composition? What are their historical names?
10. Where is the Octagonal Square? What is its modern name?
11. What famous people lived and worked in Tver?
12. What are the full names of these famous Russian writers and poets?
13. What writers and poets our contemporaries come from Tver or live here?
14. Can you name at least one literary work each of them is famous for?
15. How is M. Y. Saltykov-Shchedrin also important for Tver?
16. What large Tver enterprises do you know?
17. What is the largest library in Tver?
18. What is this library famous for?
19. How many higher schools are there in Tver?
20. Why is our town so attractive for tourists?

Exercise 18. Translate the following sentences into English.

1. Он расположен на Волге.
2. Тверь – один из старейших русских городов.
3. Город Тверь на 12 лет старше Москвы.
4. В Твери много современных предприятий.
5. В городе живет около 400 тысяч человек.

6. Тверь растёт и становится краше с каждым годом.
7. Полиграфический комбинат выпускает сотни учебников и журналов.
8. Памятник Афанасию Никитину находится на берегу Волги.
9. Библиотека имени Горького – одна из старейших в городе.

Exercise 19. Complete the following sentences with suitable verbs in the right forms.

1. Tver _____ in the 12th century.
2. The centre of the town _____ by Kasakov and Nikitin.
3. This centre _____ to our days.
4. A monument to Krylov _____ in our town.
5. Many new buildings _____ in the former «outskirts».
6. The Gorky Library _____ in a big building.
7. The town _____ by forests.

Exercise 20. Read the following small texts and give them titles.

1. The Oktyabrskaya Railway linking Moscow and St Peterburg is crossing the town. The primary Tver Railway Station has a locomotive and car shed, allowing it to service both passenger and cargo trains. Besides the Tver Station, there are three minor stations within the town perimeter: Lazurnaya, Proletarskaya and Doroshikha. The suburban railway service links Tver to Moscow, Bologoe, Torzhok and Vasilevsky Mokh (via a separate line). Most trains passing from Moscow to the north-west regions make a short stop in Tver.

2. The major M 10 motorway linking Moscow and St Peterburg is also crossing the town. This motorway is a part of Pan-European corridorssystem. The roads to Rzhev (A 112), Vesjegonsk (P 84) and Volokolamsk (P 90), along with many smaller regional roads, originate in the town. The new highway between Moscow and St Peterburg, that is being designed at the present time, will pass closely to the northern border of Tver. Tver is notable by a pretty high relative number of private cars: there are 288 cars per thousand residents, which is well above average among other regions of Russia. There is also a local bus station that interconnects Tver with minor towns of the home region, neighbouring regions, and Moscow. Local public transport consists of trolleybuses, trams, buses, and fixed-run taxis.

Exercise 21. a) Translate into English the following text about the early days of Tver railway carriage building plant.

История Тверского вагоностроительного завода – это история российского вагоностроения. А она неразрывно связана с историей развития Российских железных дорог.

В 1857 году был издан императорский указ о строительстве первой сети железных дорог протяженностью 4000 верст, а в последующие годы ежегодно вводилось в действие по 1750 км стальных магистралей. Железным дорогам во всевозрастающем объеме требовался подвижной состав. Но единственный в России Александровский завод, строивший вагоны, паровозы и занимавшийся их ремонтом, не обеспечивал растущие потребности железных дорог в подвижном составе. Поэтому пассажирские вагоны закупали за границей, преимущественно в Германии и Франции, но они не удовлетворяли ни климатическим условиям России, ни техническим требованиям, предъявляемым к вагонам русскими инженерами.

В 1892-1896 годы был принят ряд законов, по которым железные дороги обязывались приобретать весь подвижной состав, в том числе и пассажирские вагоны, только отечественного производства. В Твери началось строительство «Верхне-волжского завода железнодорожных материалов». Он должен был специализироваться на выпуске железнодорожного подвижного состава от грузовых платформ и вагонов до пассажирских вагонов высшего класса.

b) What do you know about the further history of the Tver railway carriage building plant and its connections with the war and cosmos machine-building? What famous mechanical engineers working at our plant at different time can you name?

Exercise 22. Read the text about Tver again and get ready to speak about it.

Exercise 23. Read the following words and expressions. They are all used in giving directions. Translate them.

across	along	down	in front of	opposite
past	through	towards		

Go straight ahead for ... yards / meters.

Take the first / second / *etc.* on the right / left.

Turn right / left at

It's on your right / left.

You can't miss it.

Exercise 24. Read and translate the text. Mark all the prepositions of place you come across in the text.

The library is on the corner of Station Road and Green Street, opposite the flower shop. It's easy to get there from this place. You go down the path, past the pond, over the bridge, and out of the gate. Then you go across the road and

take the path through the wood. When you come out of the wood you walk up the path and into the Church Street. Then you walk along it and through the tunnel under the railroad and you see the flower shop right in front of you. Turn round and there you are. It takes seven minutes.

Exercise 25. Read the text and put in suitable prepositions.

Let me tell you how to get to our place. Are you coming by car? OK. You drive _____ the A 1734 _____ Blackstone for about twelve miles; go _____ the first turn to Stroop, take the second turn, and then go straight on until you come to a crossroads. Go straight _____ the crossroads, _____ a petrol station, take the next right and drive _____ the park. On the other side of the park, go _____ the canal bridge, _____ the hill, turn left _____ the Market Square, keep straight on _____ the railway bridge and you'll come _____ Miller Street. It's probably best to park there, because there isn't usually a space _____ our house. We're just _____ the corner from the post office – 37 Jackdaw Lane.

Exercise 26. Read the following dialogue, say in what situations it is possible, learn it by heart and act it out.

Paul	Excuse me, please.
Passer-by	Yes?
Paul	Could you tell us how to get to the Exhibition Hall?
Passer-by	Oh, well, let me see, walk down the road. Take the first turn to the right and walk straight until you come to the river.
Paul	River?
Passer-by	Yes. You can't quite see it clearly from here. When you come to it, there is a bridge. Just walk across it.
Paul	Down the road, turn to the right, then straight again and across the bridge. Am I right? Thank you very much.
Passer-by	Not at all.
Julia	Is it very far? I mean how long it will take us to walk there?
Passer-by	About 15 minutes, if you walk quickly.
Paul	Thank you.
Passer-by	Don't mention it.

Exercise 27. Match the English replies with the Russian equivalents at the dialogue.

Visitor: Can you tell me how to reach the bank please?

У меня карта СИБ и я хотел снять деньги в банке.

Policeman: Which bank? There are two: the Allied Irish Bank and the Bank of Ireland.

Visitor: I have an AIB pass card and I want to withdraw money from the bank.

Policeman: You need to go to the Allied Irish Bank which is near the local shopping centre, Dunnes Stores.

Visitor: How do I get there? I have no knowledge of this area.

Policeman: Cross the road and turn left at the other side. Walk along the footpath until you reach the traffic lights. You will see a shopping centre on the right hand side. Walk across the road and turn right after the shopping centre. Keep going straight for about 100 m and the bank is to your left.

Visitor: It sounds very complicated. How far is it from here?

Policeman: It's not so complicated. It's about five minutes walk from here. I can draw a map for you if you wish.

Visitor: Oh, I would really appreciate that. By the way will I be going North or South?

Policeman: You will be going northwards. You are now in the Western part of the city and the Allied Irish Bank is situated in the

Звучит очень сложно. Это далеко?

Как мне туда попасть? Я не знаю этот район.

Вам нужно на север. Вы находитесь в западной части города, а банк находится в северо-восточной.

Подскажите, пожалуйста, как мне попасть в банк?

Перейдите через дорогу и поверните на лево. Идите по тротуару до светофора. Вы увидите торговый центр по правой стороне. Перейдите через дорогу и поверните направо за торговым центром. Пройдите прямо около 100 метров и банк будет справа от вас.

Тогда вам нужно в Союзный ирландский банк, что возле местного торгового центра Даннес.

Какой банк? Здесь их два: Союзный ирландский банк и Банк Ирландии.

О, это было бы замечательно! Кстати, мне нужно идти на севр или на юг?

Это не так сложно. Путь отсюда займет около пяти минут. Я могу нарисовать карту для вас если хотите.

North East. Here's a rough sketch of the area.

Exercise 28. Complete the following dialogues, learn them by heart and act them out.

a)

A ...

B Yes?

A ... the Central Park?

B ... Well, go down the street and then take the second turn to the left.

A ...

b)

A The library?

B ...

A Is it far from here? ...

B ...

c)

A ...

B About 10 minutes.

A Thank you.

B

d)

A Excuse me, could you ...

B ... the road, ... turn, ... straight. ... across the bridge.

A Thank you very much.

B ...

Exercise 29. Read the following words and expressions. They are all used in telephone conversations. Divide them logically into three groups; what groups are these? Translate the phrases.

Hello, I'd like to speak to Mr

Speaking.

I'm afraid he's in a meeting / not in the office / still at lunch / not available right now. Is there anything I can do for you?

Hello, this is Miss ... calling from

Hold on a moment, please.

Could you ask her to call me back, please?

I'll just find out if she's back yet / in the other office / available.

Is Ms ... available, please? My name's

I'll put you through to Miss

Could you give him a message, please?

I'll call you back later today.

I'll ask her to call you back as soon as she's free.

What's your extension number / fax number?

What time do you expect her back?

Thank you very much for your help.

Exercise 30. Read the following telephone dialogues and decide who is speaking to who, what about, and how well they know each other.

a)

Peter Hello. 793422.

John Hello, Peter. This is John.

Peter Hi. John. How are you?

John Fine, thanks. And you?

Peter All right. Did you have a nice weekend? You went away, didn't you?

John Yes, we went to see some friends who live in the country. It was lovely. We had a good time.

Peter Ah, good.

John Peter, could you do me a favour? I'm playing squash tonight, but my racket's broken. Could I borrow yours?

Peter Sure, that's fine.

John Thanks a lot. I'll come and get it in half an hour, if that's OK.

Peter Yes, I'll be in.

John OK, bye.

Peter Bye.

b)

Recording Good morning, Barnes Johnson... For Sales, press one. For Accounts, press two. For Enquiries, please hold.

Donna Barnes Johnson. Thank you for calling. This is Donna speaking. How can I help you?

Georgia Hello, my name's Georgia King. I'd like to speak to Jon Barnes, please.

Donna Sorry. What name is that?

Georgia It's Georgia King speaking.

Donna Oh, I'm afraid Mr Barnes isn't here at the moment. Can I take a message?

Georgia Well, I'm returning his call. He left me a message to call him.

Donna OK. Can you hold on, please... The line's busy at the moment. Can you call Mr Barnes back later?

Georgia Um... can I leave a message please?

Donna Oh just a minute, I'll put you through to one of his colleagues. I'll just put you on hold...

Exercise 31. Work in pairs. Follow these flowcharts to practice making a phone call, using some of the expressions in Exercises 29 and 30. Do this twice, so that you each have a turn playing both roles.

Say in what situations these dialogues are possible.

To simulate the situation of a telephone conversation, you and your partner must sit back-to-back so that you can't see each other's faces.

a)

Student A phones **Student B**.

B Answer the phone.

A Say who you are. Ask how B is.

B Reply.

A Ask what B is doing tonight. Invite him / her to go out for a meal.

B You can't tonight. Say what you're going to do.

A Suggest tomorrow night.

B You can't. Say why. Suggest some time next week.

A You can't. You're going away on business. Suggest Saturday evening.

B Agree.

A + B Arrange a time and a place to meet. Give all the instructions how to get there.

A + B Say goodbye.

b)

Student A phones **Student B**.

B Answer the phone.

A Ask to speak to Mr Anderson.

B He's in a meeting.

A Ask when he'll be free.

B You don't know. Offer to find out.

A Say you'll wait.

- B** He won't be free till 6 p. m.
A You want him to call you first thing tomorrow.
B Find out the caller's name and number.
A Give your name and number.
B Note down the information and say you'll leave the message on his desk.
A Say thanks and goodbye.

UNIT TWO

MECHANICAL ENGINEERING BRANCHES

PRONUNCIATION AND VOCABULARY EXERCISES

Exercise 1. Read the following words. Pay attention to the pronunciation of the diphthongs and triphthongs. Can you give more examples of words with the same vowel combination?

[ei]	say, face, break, maintenance, failure, rotation, constrain, tape
[ai]	wife, cry, apply, grinding, hydraulic, kind, guiding, cycle, slide, china
[oi]	boy, point, pointless, coin
[au]	out, loud, bough, plough, found, flounce
[əu]	note, phone, telephone, total, though, motion, known
[iə]	year, beard, area, engineering
[eə]	fair, care, wear, various
[uə]	pure, cure
[auə]	our, flour, flower, tower, power
[əuə]	lower, Owen
[aiə]	fire, tyre, entirely, require
[eiə]	player
[oiə]	employer

Exercise 2. Match the following words with their pronunciation.

ache	again	carry	cold	get	work	grey	comb	give	cake
big	keys	back	guest	called	coffee	bigger	walk	bag	kiss
gɪv	bɪg	get	kəʊm	ki:z	keɪk	kɪs	eɪk	gest	bæk
'kɒfi	ə'gen	wɜ:k	kɔ:ld	bæg	'bɪgə	kəʊld	'kæri	wə:k	greɪ

Exercise 3. Look at the common adjective suffixes. Use the suffixes to make adjective from the words in the table. Can you give more word examples?

–able	to drink, to wash, to read, to recognize, to count, to eat, to negotiate
–ous	danger, an industry, an ambition, fame
–y	a noise, fun, a boss, a rain, dirt, a cloud
–ic	a photograph, to terrify, history, a poet, drama, a system, an organ
–ly	a friend, a day, a neighbour

<i>-ful</i>	use, help, care, hope
<i>-less</i>	use, help, care, hope
<i>-al</i>	a specialty, a nation, a culture, influence, an orchestra, a mechanic
<i>-ive</i>	to innovate, to create, to impress, to act
<i>-ish</i>	grey, red, eight, Poland
<i>-ent</i>	to differ, to depend, to insist

Exercise 4. Look at the common adverb suffixes. Use the suffixes to make adjective from the words in the table. Can you give more word examples?

<i>-ly</i>	kind, warm, deep, profound, great, gross, strong, wide
<i>-ward</i>	north, side, back, sea, in, out
<i>-wise</i>	clock, drop

Exercise 5. Identify the following as a noun (N), a verb (V), an adjective (ADJ), or an adverb (ADV) by the suffix.

- | | | | |
|----------|---------------|-----------|---------------|
| 1. _____ | perfectionism | 9. _____ | ability |
| 2. _____ | energetic | 10. _____ | hasten |
| 3. _____ | childhood | 11. _____ | sponsorship |
| 4. _____ | fantasize | 12. _____ | jovial |
| 5. _____ | graceful | 13. _____ | commemorate |
| 6. _____ | eagerly | 14. _____ | publicly |
| 7. _____ | allowance | 15. _____ | happiness |
| 8. _____ | suitable | 16. _____ | anticlockwise |

Exercise 6. Revise the English suffixes and prefixes and complete the table. Translate all the words you get.

noun	verb	adjective	adverb
		influential	
		distinctive	
authority			
		charming	
		competent	
	provide		
communicator			
exception			
generalization			
		intervening	
theorist			
		different	

Exercise 7. Read the text. Fill in the blanks with the suitable words from the box in the form of adjectives.

Russia marsh mountain Siberia

For _____ people, the “Far East” is the broad coast along the Pacific Ocean, facing Alaska in the far north and Japan in the sub-tropical south, and including the large island of Sakhalin. Inland lie forests, mountains, lakes, rivers and marshes known as Siberia. Siberia is usually divided into Western and Eastern, the former is _____ and low-lying and rich in oil, the latter is _____ and rich in minerals, gold and diamonds.

The twenty million people who live in this region are mostly Russians and Ukrainians by origin. Besides there live other people. They all call themselves _____ and speak of Russia as beginning west of the Urals.

Exercise 8. Here are some words that you will come across in the texts of the unit. Study them carefully.

adjectives and participles		nouns	
appropriate	подходящий, соответствующий <i>чему-л.</i>	assignment	назначение
compatible	совместимый	axis	ось, осевая линия; вал
intricate	сложный, запутанный	flow	поток
punched	перфорированный	flywheels	маховик, маховое колесо
adverbs		grinding	шлифование
accurately	точно, правильно, тщательно	machining	(механическая) обработка, обработка на станке
entirely	исключительно	output	производительность, выработка, выпуск
steadily	постоянно, неуклонно	sequence	последовательность, порядок следования
preposition		slide	скольжение
via	через, путем	spindle	шпиндель
		swarf	отходы обработки, металлическая стружка
		template	трафарет, шаблон
		tracing	трассировка; вычерчивание, прочерчивание
		value	ценность

READING AND COMPREHENSION EXERCISES

Exercise 1. Read the following text and translate it.

Assembly Line

1. An assembly line is industrial arrangement of machines, equipment, and workers for continuous flow of workpieces in mass-production operations. It is designed by determining the sequences of operations for manufacture of each product component as well as the final product. Each movement of material is made as simple and short as possible. Work assignments, numbers of machines, and production rates are programmed so that all operations performed along the line are compatible.
2. An automotive assembly line starts with a bare chassis; components are attached successively as the growing assemblage moves along the conveyor. Parts are matched into subassemblies on feeder lines that main line to deliver body parts, engines, and other assemblies. As the units move past, each worker along the line performs a specific function. Each part and tool is delivered to its point of use in synchronization with the time. A number of different assemblies are on the line simultaneously, but an intricate system of scheduling and control ensures that the appropriate body type and colour, trim, engine, and optional equipment arrive together to make the desired combinations.
3. Automated assembly lines consist entirely of machines run by machines. In such continuous-process industries as petroleum refining and chemical manufacture and in many modern automobile-engine plants, assembly lines are completely mechanized and consist almost entirely of automatic, self-regulating equipment.
4. Most products, however, are still assembled by hand because many component parts are not easily handled by a simple mechanism. The number of products automatically assembled is steadily increasing but at a low rate because a product must be designed for automatic assembly and must be accurately and consistently manufactured. Expensive and somewhat inflexible, automatic assembly machines are economical only if run at very high outputs. However, the development of versatile automatic machinery and industrial robots is increasing the flexibility of fully automated assembly operations.

Exercise 2. Re-read the text and determine if the following statements are:

- true
 - false
 - of no information in the text.
-
1. Automatic assembly lines are economical only if run at a very high speed.
 2. The number of products assembled automatically is increasing slowly.

3. Industrial robots with fully automated assembly operations will be extensively used in future.
4. An automated assembly line consists of machines, equipment, and workers.

Exercise 3. Indicate which part of the text (1, 2, 3, or 4) the following information corresponds to:

1. the performance of an automotive assembly line.
2. some problems with automated assembly line.

Exercise 4. Answer the question about the text.

Why are most products still assembled by hand?

1. Because it is much cheaper and faster.
2. For them to be manufactured accurately and consistently.
3. So that all operations performed along the line are compatible.
4. Because many component parts are not easily designed for automatic assembly.

Exercise 5. Read the text again and determine its main idea.

1. The number of products automatically assembled is steadily increasing.
2. Automatic assembly machines are flexible.
3. In petroleum refining, chemical manufacture and automobile-engine plants assembly lines are completely mechanized.

Exercise 6. Read the following text. Three sentences have been removed from it. From the sentences below (A-D) choose the one which fits the appropriate gap (1-3). There is one extra sentence you do not need.

Machine tool

A machine tool is a machine, typically powered other than by human muscle (e.g., electrically, hydraulically, or via line shaft), used to make manufactured parts (components) in various ways that include cutting or certain other kinds of deformation. All machine tools involve some kind of fundamental constraining and guiding of movement provided by the parts of the machine, such that the relative movement between workpiece and cutting tool (which is called the toolpath) is controlled or constrained by the machine to at least some extent, rather than being entirely “offhand” or “freehand”. Machine tools archetypically perform conventional machining or grinding on metal (that is, metal cutting by shear deformation, producing swarf), but the definition can no longer be limited

to those elements, if it ever could, because other processes than machining may apply, and other workpiece materials than metal are common. Machine tools were born when the toolpath first became guided by the machine itself so that direct human guidance of the toolpath (with hands or feet) was no longer the only guidance used in the cutting or forming process.

(1.) _____ . First is the spindle concept, which constraints workpiece or tool movement to rotation around a fixed axis. Then comes the machine slide, which has many forms, such as dovetail ways, box ways, or cylindrical column ways.

(2.) _____ . The third important concept is tracing, which involves following the contours of a model or template and transferring the resulting motion to the toolpath. Finally, there's Cam operation, which is related in principle to tracing but can be a step or two removed from the traced element's matching the reproduced element's final shape. When considering the difference between freehand toolpaths and machine-constrained toolpaths, the concepts of accuracy and precision, efficiency, and productivity become important in understanding *why* the machine-constrained option adds value. With a machine tool, toolpaths that no human muscle could constrain can be constrained; and toolpaths that are technically possible with freehand methods, but would require tremendous time and skill to execute, can instead be executed quickly and easily. Machine tools can be operated manually, or under automatic control. Early machines used flywheels to stabilize their motion.

(3.) _____ . NC machines used a series of numbers punched on paper tape or punched cards to control their motion. In the 1960s, computers were added to give even more flexibility to the process. Such machines became known as computerized numerical control (CNC) machines. NC and CNC machines could precisely repeat sequences over and over, and could produce much more complex pieces than even the most skilled tool operators.

- A** Machine slides constrain tool or workpiece movement linearly.
- B** The mechanical toolpath guidance grew out of any of various root concepts.
- C** Soon after World War II, the numerical control (NC) machine was developed.
- D** The earliest lathe with direct mechanical control of the cutting tool's path was a screw-cutting lathe dating to about 1483.

Exercise 7. Answer the following questions about the text.

1. What is a machine tool?
2. What do machine tools archetypically perform?

3. Why can the definition no longer be limited to those elements?
4. Do you think it is right to say that all machine tools are “machines that help people to make things”, although not all factory machines are machine tools?
5. What are the root concepts behind the mechanical toolpath guidance?
6. How do machine-constrained toolpaths differ from freehand toolpaths? What are their advantages?
7. Machine tools can be powered from a variety of sources, can they not?
8. What is a NC machine? What is a CNC machine?

Exercise 8. Complete the sentences with the information from the text.

1. A machine tool is a machine, typically powered other than by ... (e.g., ... , ... , or via ...), used to make ... in various ways that include cutting or certain other kinds of deformation.
2. Machine tools archetypically perform conventional
3. Machine tools were born when
4. The first root concept that the mechanical toolpath guidance grew out of is ... which constraints workpiece or tool movement to rotation around a fixed axis.
5. The second one is ... , which has such forms as dovetail ways, box ways, or cylindrical column ways.
6. The third important concept is ... , which involves following the contours of a model or template and transferring the resulting motion to the toolpath.
7. The last but not the least is ... , which can be a step or two removed from the traced element's matching the reproduced element's final shape.
8. The difference between freehand toolpaths and machine-constrained toolpaths lies in the concepts of ... , ... , and ... which add
9. ... and ... machines could precisely repeat sequences over and over, and could produce very complex pieces.

Exercise 9. Match the terms from the text to their Russian equivalents.

machine	маховик
line shaft	перфокарта
machining	вращательное движение
swarf	числовое программное управление (ЧПУ)
spindle	эффективность
rotation around a fixed axis	трансмиссия
accuracy and precision	обработка резанием
efficiency	шпиндель
flywheels	машина, устройство, механизм
numerical control (NC)	стружка
punched cards	точность

Exercise 10. Find in the text the English equivalents for the following Russian words and phrases.

Мускульная сила человека; деформация сдвига; фундаментальное ограничение; относительное движение; деформация сдвига; стало управляемым непосредственно машиной; процесс резки или формирования; ограничить движение инструмента или заготовки; калькирование; следовать контурам модели или шаблона; кулачковый механизм; соответствовать окончательной форме воспроизводимого элемента; требовать много времени и умения для выполнения; управляться вручную или автоматически; придать процессу большую гибкость; точно повторять последовательности; производить намного более сложные элементы; самые квалифицированные операторы.

Exercise 11. Find in the text the following English words and phrases and give their Russian equivalents.

Typically powered by; manufactured parts; other kinds of deformation; to at least some extent; archetypically; no longer; if it ever could; common; dovetail ways, box ways, or cylindrical column ways; is related in principle to; when considering the difference between; with a machine tool; freehand methods; to stabilize their motion; became known as; numerical control (NC) machines; computerized numerical control (CNC) machines; repeat sequences over and over; much more complex pieces.

Exercise 12. Read the text again and divide it into paragraphs (logically, you may have four or five of them).

Exercise 13. Read the following text quickly to get an idea of what it is about. Ignore the words you do not know. Choose the most suitable heading from the list A-H for each part (1-7). There is one heading which you do not need.

- A** Laser definition
- B** Laser applications
- C** Laser weapons
- D** Laser safety
- E** Laser construction
- F** Laser fictional predictions
- J** Laser history
- H** Laser design

1. A **laser** is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons. The term “laser” originated as an acronym for *Light Amplification by Stimulated Emission of Radiation*. The emitted laser light is notable for its high degree of spatial and temporal coherence, unattainable using other technologies. In modern usage “light” broadly denotes electromagnetic radiation of any frequency, not only visible light, so we speak about *infrared laser*, *ultraviolet laser*, *X-ray laser*, and so on.
2. A laser consists of a gain medium inside a highly reflective optical cavity, as well as a means to supply energy to the gain medium. The gain medium is a material with properties that allow it to amplify light by stimulated emission. In its simplest form, a cavity consists of two mirrors arranged such that light bounces back and forth, each time passing through the gain medium. Typically one of the two mirrors, the output coupler, is partially transparent. The output laser beam is emitted through this mirror.
3. The invention of laser would have been impossible without the ideas and developments of Albert Einstein, Max Planck, Rudolf W. Ladenburg, Willis E. Lamb and R. C. Retherford, and Alfred Kastler. In 1953, Charles Hard Townes and graduate students James P. Gordon and Herbert J. Zeiger produced the first microwave amplifier, a device operating on similar principles to the laser, but amplifying microwave radiation rather than infrared or visible radiation. Townes's maser was incapable of continuous output. Meanwhile, in the Soviet Union, Nikolay Basov and Aleksandr Prokhorov were independently working on the quantum oscillator and solved the problem of continuous-output systems by using more than two energy levels. In 1955, Prokhorov and Basov suggested optical pumping of a multi-level system as a method for obtaining the population inversion, later a main method of laser pumping. In 1957, Charles Hard Townes and Arthur Leonard Schawlow, then at Bell Labs, began a serious study of the infrared laser. As ideas developed, they abandoned infrared radiation to instead concentrate upon visible light. The concept originally was called an “optical maser”. In 1964 Charles H. Townes, Nikolay Basov, and Aleksandr Prokhorov shared the Nobel Prize in Physics, “for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser – laser principle”.
4. When lasers were invented in 1960, they were called “a solution looking for a problem”. Since then, they have become ubiquitous, finding utility in thousands of highly varied applications in every section of modern society, including consumer electronics, information technology, science, medicine, industry, law enforcement, entertainment, and the military. The first use of lasers in the daily lives of the general population was the supermarket barcode scanner, introduced in 1974. The laserdisc player, introduced in 1978, was the first successful consumer product to include a laser but the compact disc player was the first laser-

equipped device to become common, beginning in 1982 followed shortly by laser printers.

5. Even the first laser was recognized as being potentially dangerous. Theodore Maiman characterized the first laser as having a power of one “Gillette” as it could burn through one Gillette razor blade. Today, it is accepted that even low-power lasers with only a few milliwatts of output power can be hazardous to human eyesight, when the beam from such a laser hits the eye directly or after reflection from a shiny surface. At wavelengths which the cornea and the lens can focus well, the coherence and low divergence of laser light means that it can be focused by the eye into an extremely small spot on the retina, resulting in localized burning and permanent damage in seconds or even less time.

6. Laser beams are famously employed as weapon systems in science fiction, but actual laser weapons are still in the experimental stage. The general idea of laser-beam weaponry is to hit a target with a train of brief pulses of light. The rapid evaporation and expansion of the surface causes shockwaves that damage the target. The power needed to project a high-powered laser beam of this kind is beyond the limit of current mobile power technology thus favoring chemically powered gas dynamic lasers. On March 18, 2009 Northrop Grumman claimed that its engineers in Redondo Beach had successfully built and tested an electrically powered solid state laser capable of producing a 100-kilowatt beam, powerful enough to destroy an airplane or a tank. According to Brian Strickland, manager for the United States Army’s Joint High Power Solid State Laser program, an electrically powered laser is capable of being mounted in an aircraft, ship, or other vehicle because it requires much less space for its supporting equipment than a chemical laser. However the source of such a large electrical power in a mobile application remains unclear.

7. Several novelists described devices similar to lasers, prior to the discovery of stimulated emission. A laser-like device was described in Alexey Tolstoy’s science fiction novel *The Hyperboloid of Engineer Garin* in 1927. Mikhail Bulgakov exaggerated the biological effect (laser bio stimulation) of intensive red light in his science fiction novel *Fatal Eggs* (1925), without any reasonable description of the source of this red light. (In that novel, the red light first appears occasionally from the illuminating system of an advanced microscope; then the protagonist Prof. Persikov arranges the special set-up for generation of the red light.)

GRAMMAR EXERCISES

Exercise 1. Revise the sequence of tenses rules. Translate the following sentences.

1. We didn’t know where our friends went every evening.
2. We didn’t know where our friends had gone.

3. She said that her best friend was an engineer.
4. She said that her best friend would be an engineer.
5. I didn't know that you had worked at the Hermitage.
6. We found that she left home at eight o'clock every morning.
7. Adrian said he was having a party at his flat that evening.
8. When he learned that his son had received an excellent mark at school, he was very pleased.
9. Barbara said she'd only been to England once.
10. My uncle said he would bring and show us the photographs he had taken during his two weeks' stay at the Caucasus.

Exercise 2. Complete the sentences with the suitable pronoun / adjective *some*, *any*, *no* or their compound (*something* / *anyone* / *nobody* / *everywhere* / *etc.*). Translate the sentences.

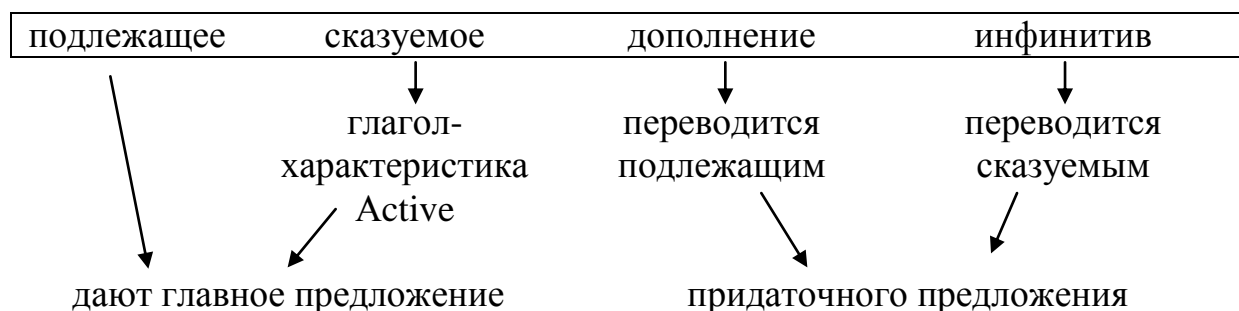
1. There are _____ pictures in the book.
2. Are there _____ English text-books on the desks? – Yes, there are _____.
3. Are there _____ maps on the walls? – No, there aren't _____.
4. Please tell us the story. _____ knows it.
5. Has _____ here got a red pencil?
6. _____ can answer this question. It is very easy.
7. I put my dictionary _____ yesterday and now I can't find it _____. – Of course, that is because you leave your books _____.
8. You must go _____ next summer.
9. Is there _____ interesting in the program of the concert?
10. I could see _____ : it was quite dark.
11. I didn't take any money with me so I couldn't buy _____.
12. The question was so difficult that _____ could answer it.
13. Have you got _____ English books at home? – Yes, I have _____.
14. There is _____ ink in my pen: I cannot write.
15. You must find _____ who can help you.
16. _____ knew anything about America before Columbus discovered it.
17. Did you go _____ on Sunday?
18. Let's go _____. The weather is fine. I don't want to stay at home in such weather.
19. I cannot find my glasses _____. I always put them _____ and then look for them for hours.
20. Is there _____ in my group who lives in the dormitory?

Exercise 3. Translate the sentences paying attention to the **complex object** structure.

Complex Object – сложное дополнение

(существительное в общем падеже или местоимение в объектном падеже + инфинитив)

Переводится дополнительным придаточным предложением, вводимым словами *что, чтобы, как*.



Например:

We want Peter (him) to go there with us. – Мы хотим, чтобы Петр (он) поехал туда с нами.

We made him go there. – Мы заставили его поехать туда.

-
1. We proved this suggestion to be wrong.
 2. Aristotle supposed happiness to be associated with some human activity.
 3. The whole world knows Lobachevsky to have strictly demonstrated and explained the principles of the theory of parallel lines.
 4. For 2200 years all the mankind believed Euclid to have discovered an absolute truth.
 5. Lobachevsky proved Euclid's axiom on parallel lines not to be true.
 6. He built a new geometrical theory quite different from that of Euclid. We know his ideas to have greatly influenced not only geometry, but mechanics, physics, astronomy as well.
 7. Millions of people saw on their TV screens Soviet cosmonaut Leonov fearlessly floating in the open space.
 8. Most scientists expect major development in the nearest future to take place in biology.
 9. One can hardly expect a true scientist to keep within the limits of one narrow long-established field.
 10. We know Newton's laws of motion to be based upon his own and Galileo's experiments.

11. Joule showed heat and mechanical energy to be interchangeable at a constant rate of exchange.
12. We supposed all the details of the plan to have been explained to you long ago.
13. I want you to tell me everything from the time we parted yesterday.
14. The known volatility and oxide forming properties of polonium metal require the reaction to be carried out in a closed system and ether in an inert atmosphere or in vacuum.
15. I was sitting quietly at my table when I heard something jump in at the window and then run about from one side of the room to the other.
16. He heard the professor say something to her junior assistant.
17. The present-day situation forces more and more countries to start contributing to this field of research.
18. One will naturally think such course of events to be disastrous not only for science but for future of mankind.
19. I saw the driver opening his window and throwing a box into the bushes.
20. Would you like me to go now?
21. He is not only critical of the work of others, but also of his own, since he knows the man to be the least reliable of scientific instruments.
22. I noticed him starting at the newcomer.
23. Now he never allows anything to be done in a hurry.
24. Olive heard the side gate open and looking out of the window she saw John walking up the garden.
25. On entering the house, she saw her son walking up and down in an agony of doubt.

Exercise 4. Verbs of perceptions, for example, *hear* and *watch*, can be followed by the infinitive without *to* or the participle depending on the meaning. Underline the correct form in the following sentences.

1. I heard my neighbours **turn** / **turning** off their television and **go** / **going** to bed.
2. I woke up at two in the morning. I could hear my neighbours **have** / **having** an argument.
3. When I looked through the window, I saw her **read** / **reading** a book.
4. When she saw me **come** / **coming**, she waved.
5. She could feel her heart **pound** / **pounding** as she neared the end of the race.
6. Can you smell something **burn** / **burning**?
7. When I came into the room, I saw her **lean** / **leaning** casually against the fireplace.
8. It was obvious that she hadn't heard me **come** / **coming** in. I saw her **go** / **going** over to the drawer and **take** / **taking** out a gun.

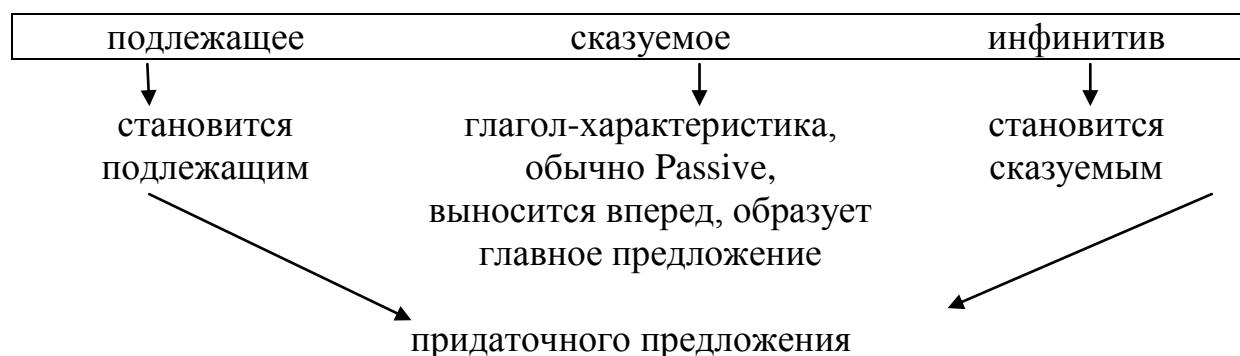
9. I've never seen anyone **eat / eating** so much as you do.
 10. As I woke up, I could hear my mother downstairs **make / making** breakfast.

Exercise 5. Translate the sentences paying attention to the **complex subject** structure.

Complex Subject – сложное подлежащее

(существительное в общем падеже или личное местоимение + инфинитив)

Переводится дополнительным придаточным, присоединяемым к главному или неопределенно-личному предложению словами *что, чтобы, как*; простым предложением с вводным в середине, которое соответствует сказуемому в английском языке (*как известно, как говорят и т. д.*)



Сказуемое может быть выражено:

глаголом Active	глаголом Passive	словосочетаниями
to be said – говорят	to seem – казаться	to be likely – очевидно, вероятно
to be known – известно	to appear – по-	to be unlikely – маловероятно
to be seen – видели	видимому /оказываться	
to be reported – сообщают	to prove – доказывать, оказываться	to be sure – безусловно /конечно
to be expected – ожидается / полагают	to turn out – оказываться	to be certain – конечно /несомненно
to be supposed – полагают /предполагают	to chance – случаться	to be uncertain – сомнительно
to be considered – считают /полагают	to happen – случаться /оказываться	
to be believed – считают /полагают		

to be found – обнаружили		
to be thought – считается		

Например:

Petrov (he) is said to be ill now. – Говорят, что Петров (он) сейчас болен.

He is known to live in Kiev. – Известно, что он живет в Киеве. (Он, как известно, живет в Киеве).

-
1. He is said to avoid all sorts of arguments.
 2. He is said to have graduated from Oxford University.
 3. He seems to have taken an advantage of the favorable conditions.
 4. This scientist is known to be keeping in touch with the latest developments in his field of research.
 5. He happens to work at the same problem.
 6. He is sure to argue about it.
 7. Your advice proved to be helpful.
 8. Gold was proven to be unattacked by moisture.
 9. The results obtained were found to be in perfect agreement with earlier findings.
 10. The people from the Institute of Optics are known to work hard at a new device.
 11. The interpretation was found to be convincing.
 12. They obtained what seemed to be a strong acid.
 13. They built what is believed to be the greatest church of that time.
 14. This student has never been thought to pass examinations.
 15. This substance was not observed to possess radioactive properties.
 16. He does not appear to be concerned with the problem.
 17. He was not expected to spoil the sample.
 18. He is not believed to represent the majority.
 19. This equation may easily be demonstrated to be a first order equation.
 20. This substance is seen through a microscope to consist of small crystals.
 21. This method was considered by the author to be inaccurate.
 22. The theory is discussed and found to be substantially in agreement with the experimental results.
 23. This element was isolated and found to possess valuable properties.
 24. There seems to be some confusion of terms in the paper.
 25. There seems to exist a great need to experimenting.

Exercise 6. Translate the sentences paying attention to the **for + infinitive** structure.

for + существительное (местоимение) + инфинитив

Переводится оборотом, соответствующим различным придаточным предложениям: предлог *for* помогает определить начало русского придаточного предложения, вводимого союзами *что, чтобы*, в котором инфинитив становится сказуемым.

Следует, однако, иметь в виду, что не всегда есть необходимость при переводе оформлять этот оборот придаточным предложением.

Например:

For this method to be valuable it must be improved. – Чтобы этот метод был полезным, его необходимо усовершенствовать.

Speak louder for him to hear you. – Говорите громче, чтобы он вас слышал.

There is a possibility for him to attend the conference. – У него есть возможность присутствовать на этой конференции.

It is easy for you to say that. – Вам легко говорить.

1. For the reaction to take place two conditions must be met.
2. It is for you to analyze which of these two methods is wrong.
3. It is important for scientists to know the structure of the material world.
4. Eight minutes are required for light to travel from the Sun to the Earth.
5. For the system to be correct it must only use well-established components.
6. For any natural physical state to change, some changes of the condition acting upon this state must occur.
7. The equipment is too complex for a common operator to control.
8. For two molecules to react they must be in contact.
9. The time required for amount of radiation to be reduced to half the original amount is different for different materials.
10. It was impossible for us to make this axle rotate without anybody's help.
11. For the exam to pass successfully you have to work at your English during the whole term.
12. It is not quite difficult for students to work regularly.
13. The time required for a mass to come to rest can be calculated without difficulty.
14. The problem discussed is too complex for you to handle.
15. There is nothing for them to worry about.
16. The students were waiting for the assistant to adjust the device for work.
17. It is advisable for post-graduates to know at least one foreign language.

Exercise 7. Translate the sentences paying attention to the **modal verb + perfect infinitive** structure.

a modal verb

(must / have to / be to;
can / could;
may / might;
should / ought to)

+ **perfect infinitive** (have + V₃)

Если за модальным глаголом следует инфинитив в перфектной форме, то этот модальный глагол передает значение уверенности, предположения, возможности, вероятности того, что какое-то действие уже произошло (об этом говорит перфектная форма инфинитива). В этих случаях при переводе смысловой глагол следует ставить в прошедшее время часто со словом *уже*, а модальный глагол переводится словами *должно быть*, *возможно*, *вероятно* и иногда выносится вперед.

must	<i>должно быть</i> очень большая уверенность в том, что действие произошло
may / might	<i>вероятно, возможно</i> меньшая большая уверенность в том, что действие произошло
could, should / ought to	<i>следовало бы</i> сожаление или упрек о несделанном

can / could + перфектный инфинитив в вопросительном и отрицательном предложениях могут переводиться словами *неужели* и *не может быть, чтобы*

to be	<i>должен был, но не сделал</i> (обозначает действие, которое должно было произойти, но не произошло)
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Например:

He must have left. – Он, должно быть, ушел.

You may have seen this article in the book. – Возможно, ты видел эту статью в книге.

You should have taken the text-book in the library. – Вам следовало бы взять учебник в библиотеке.

Could he have come? – Неужели он пришел?

He can't / couldn't have come. – Не может быть, чтобы он пришел. / Он вряд ли пришел.

He was to have come. – Он должен был прийти, но не пришел.

1. The students must have finished their experiment.
2. The students might have finished their experiment.
3. The students can't have finished their experiment.
4. The students needn't have finished their experiment.
5. The students ought to have finished their experiment.
6. The experiment should have been finished.
7. Can the experiment have been finished?
8. The experiment was to have been finished.
9. The experiment could have been finished.
10. The experiment shouldn't have been finished.
11. Each shift might have followed on where the preceding one stopped.
12. He couldn't have said it. This line should have been put into operation long ago.
13. Could he have overlooked such a serious mistake?
14. They ought to have paid more attention to the problem of fuel consumption.
15. You were to have used a device specially designed to measure certain physical changes in the atmosphere.
16. Originally, the Earth's temperature must have been extremely high.
17. The student ought to have been careful while working, with this instrument. Now the instrument is broken.
18. He may have finished his experiment, but we are not sure.
19. The explosion must have occurred long ago.
20. No living beings could have survived in such a climate.
21. Some problems of science could not have been solved without isotopes.
22. Could these rocks have been more than 5000 years old?
23. Life may have existed on this distant planet.
24. I could have gone to the conference, but I lost my invitation.
25. This phenomenon was to have been considered.

SPEECH EXERCISES

MY LIKES AND DISLIKES. MY DREAMS AND ASPIRATIONS. FAMOUS SCIENTIST

Exercise 1. Try to define your personal values. Completing the phrases below will help you get started.

1. Some of the most important things in my life are:
2. Some of my dreams are:
3. I'm really good at:
4. My short-term goals are:
5. My long-term goals are:
6. So, I believe that

Exercise 2. Read the following quotes on Dreams and Aspirations and choose the one you like best. Explain why.

1. If you can imagine it you can create it. If you can dream it, you can become it. (*William Arthur Ward*)
2. When making your choice in life, do not neglect to live. (*Samuel Johnson*)
3. Life is a cup to be filled not drained. (*Anonymous*)
4. If one is the master of one thing and understands one thing well, one has at the same time insight into and understanding of many things. (*Vincent Van Gogh*)
5. What we need is more people who specialize in the impossible. (*Theodore Roethke*)
6. Within our dreams and aspirations we find our opportunities. (*Sue Ebaugh*)
7. The future belongs to those who believe in the beauty of their dreams. (*Eleanor Roosevelt*)
8. You see things, and you say "Why?". But I dream things that never were, and I say "Why not?". (*George Bernard Shaw*)
9. If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them. (*Henry David Thoreau*)
10. Dreams come true; without that possibility, nature would not incite us to have them. (*John Updike*)

Exercise 3. Read the text about students and say what kind of students you belong to.

Students

Who are they and how do they look? In the streets, in parks, cafes, on discos, everywhere you can see young people standing together and talking about something with great interest. What are they talking about? They talk about studying, music, clothes and about money, which will finish soon. But in spite of the problems they are never sad. At the same time students walk in town, go to cafes, discos and concerts.

Students become friends very fast and forever. Perhaps later when they meet they'll talk about how they are glad to see each other, how they were missing and call each other brother, thought they were studying in different groups and saw each other only during the entrance exams. But this will be in future.

And now there are some different types of students. One part does nothing but study. Others have time for studying and for things they love to do. Someone likes going in for sport, some are fond of playing computer games, other like singing or dancing and so on. And there are some students who don't want to study and want to graduate the university with good and excellent marks.

Students wear everything that is comfortable to them. They listen to different types of music. Pop, rock, rap these are only few types they listen to. And all students like sleeping. So are they so different after all?

Exercise 4. Answer the questions.

1. What people are considered to be outstanding?
2. What qualities must they possess?
3. Is it enough to be talented to be called outstanding?
4. Are there any world famous composers of the 20th century?
5. What distinguished writers lived in the 20th century?
6. Who is the first cosmonaut, the first human being to journey into outer space? When was it? What is the name of his spacecraft? What is the world-known word that he said when taking off?
7. Who was the first human to conduct a space walk? When was it? What is the name of his spacecraft?
8. Who was the first person on the Moon? When was it? What is the name of his spacecraft? What are the world-known words that he said when setting his boot on the Moon surface?
9. Who is the man standing behind the rocket industry?
10. What famous inventors do you know?
11. Who invented the electric candle?
12. Who discovered the Periodic Law of elements?
13. Do you know any outstanding scientists of the world?
14. Which of them made great discoveries?
15. Do you know any outstanding scientists of the world in your profession / specialty?

Exercise 5. Read the following text and translate it.

Applications of mechanical engineering are found in the records of many ancient and medieval societies throughout the globe. In ancient Greece, the works of Archimedes (287 BC – 212 BC) deeply influenced mechanics in the Western tradition and Heron of Alexandria (c. 10 – 70 AD) created the first steam engine. In China, Zhang Heng (78 – 139 AD) improved a water clock and invented a seismometer, and Ma Jun (200 – 265 AD) invented a chariot with differential gears. The medieval Chinese horologist and engineer Su Song (1020 – 1101 AD) incorporated an escapement mechanism into his astronomical clock tower two centuries before any escapement can be found in clocks of medieval Europe, as well as the world's first known endless power-transmitting chain drive.

During the years from 7th to 15th century, the era called the Islamic Golden Age, there were remarkable contributions from Muslim inventors in the field

of mechanical technology. Al-Jazari, who was one of them, wrote his famous *Book of Knowledge of Ingenious Mechanical Devices* in 1206, and presented many mechanical designs. He is also considered to be the inventor of such mechanical devices which now form the very basic of mechanisms, such as the crankshaft and camshaft.

Important breakthroughs in the foundations of mechanical engineering occurred in England during the 17th century when Sir Isaac Newton both formulated the three Newton's Laws of Motion and developed calculus. Newton's Laws as well as the precise observations of Tycho Brahe and the studies of terrestrial projectile motion of Galileo became the grounds of the so called *classical mechanics*.

Exercise 6. Read the text again and think of a title for it.

Exercise 7. Look at the names in the box below. These all are world-wide known mechanical engineers. What do you know about them? Match the engineers' names and their characteristics. There are two extra characteristics, can you name the famous mechanical engineer they describe?

Ivan Ivanovich Polzunov (1728 – 1766 n.s.)	Ivan Petrovich Kulibin (1735 – 1818)	James Watt (1736 – 1819)
Yefim Alekseyevich (1774 – 1842) and Miron Yefimovich Cherepanov (1803 – 1849)		
George Stephenson (1781 – 1848)	Stepan Osipovich Makarov (1849 – 1904)	Aleksey Nikolaevich Krylov (1863 – 1945)
Henry Ford (1863 – 1947)	Ferdinand Porsche (1875 – 1951)	Mikhail Ilyich Koshkin (1898 – 1940)
Sergei Pavlovich Korolev (1907 – 1966)	Zhosef Yakovlevich Kotin (1908 – 1979)	Evgeny Oscarovich Paton (born 1953)

The chief designer of all the Soviet heavy tanks and tractors lines. The heavy KV and IS tanks, the self-propelled guns built on

A prominent American industrialist, the founder of the Motor Company of his own name, and sponsor of the development of the assembly line technique of mass production.

their frames, the PT-76 amphibious tank, the KT-12 skidding tractor, and the powerful K-700 wheeled tractor were built under his direction (the famous 122 mm gun IS-2 tank was the most powerful tank of World War II).

A Russian inventor. He is credited with creation of the first steam engine in Russia and the first two-cylinder engine in the world.

A Scottish inventor and mechanical engineer whose improvements to the Newcomen steam engine were fundamental to the changes brought by the Industrial Revolution in both the Kingdom of Great Britain and the world. The SI unit of power was named after him.

A Russian Naval engineer, applied mathematician and memoirist.

The lead Soviet rocket engineer and spacecraft designer in the Space Race between the United States and the Soviet Union during the 1950s and 1960s. He is considered by many as the father of practical astronautics.

A Ukrainian and Soviet engineer, a pioneer researcher of the new joining – welding technology for the materials. He created the methods of design of rational bridge spans, investigated the conditions of their operation, and suggested the methods to restore the damaged bridges (the Old Volga Bridge in Tver was after the War restored according to his method).

An English civil engineer and mechanical engineer who built the first public railway line in the world to use steam locomotives. Renowned as being the “Father of Railways”.

A Russian mechanic and inventor. He built a “planetary” pocket-clock, which showed not only the current time, but also the month, the day of the week, the season and the current moon phase.

His pioneering *Theory of oscillating motions of the ship*, significantly extending William Froude’s rolling theory, became internationally known. This was the first comprehensive theoretical study in the field. In 1898 he received a Gold Medal from the Royal Institution of Naval Architects, the first time the prize was awarded to a foreigner. He also created a theory of damping of ship rolling and pitching, and he was first to propose gyroscopic damping which now is the most common way of damping the roll. He actively collaborated with Stepan Osipovich Makarov, admiral and maritime scientist, working on the ship floodability problem. The results of this work soon be-

came classic and are used today worldwide.

A Soviet tank designer, the chief designer of the famous T-34 medium tank. The T-34 was the most effective and most produced tank of World War II.

An Austrian automotive engineer best known for creating the first hybrid vehicle (gasoline-electric), the Volkswagen Beetle, and the Mercedes-Benz SS / SSK, as well as the first of many automobiles of his own name. He made a number of contributions to advanced German tank designs: Tiger I, Tiger II, and the Elefant as well as the super-heavy Panzer VIII Maus tank, which was never put into production.

Russian inventors and industrial engineers, father and son. They built the first Russian steam locomotive, and then in 1835 – the second one, more powerful.

A German inventor and mechanical engineer, famous for the invention of the engine named after him.

A Russian vice-admiral, a highly accomplished and decorated commander of the Imperial Russian Navy. He was a brilliant and innovative naval architect, inventor, tactician, ship designer and a pioneering Russian oceanographer, and he also designed the first mine-laying ships intended exclusively for that purpose. He designed and built the icebreaker *Ermak* to explore the Arctic. He also developed the Russian flag semaphore system.

Exercise 8. Read the following text about Ivan Kulibin, a prominent Russian mechanical engineer.

Ivan Kulibin

Ivan Petrovich Kulibin was a Russian mechanic and inventor. He was born in 1735, on the 21st of April, in Nizhny Novgorod in the family of a trader. From childhood, Kulibin displayed an interest in constructing mechanical tools. Soon, clock mechanisms became a special interest of his. His realizations as well as his prolific imagination inspired the work of many.

During 1764-1767 he built an egg-shaped clock, containing a complex automatic mechanism. In 1769 Kulibin gave this clock to Catherine II, who

assigned Kulibin to be in charge of the mechanical workshop in the Academy of Sciences of Saint Petersburg. There, Kulibin built a “planetary” pocket-clock, which showed not only the current time, but also the month, day of the week, the season and the current moon phase. Kulibin also designed projects for tower clocks, miniature “clock-in-a-ring” types and others. He also worked on new ways to facet glass for use in microscopes, telescopes and other optical instruments.

In 1779, he built a lantern that could emit a powerful light using a weak light source. This invention was used industrially for lighting workshops, lighthouses, ships, etc. In 1791, Kulibin constructed a push-cycle cart, in which he used a flywheel, a brake, a gearbox and roller bearing. The cart was operated by a man pressing pedals. In the same year, he also designed “mechanical legs”, a prosthetic device, which was later used by a French entrepreneur. In 1793, Kulibin constructed an elevator that lifted a cabin using screw mechanisms. In 1794, he created an optical telegraph for transmitting signals over distance.

In 1801 Kulibin was fired from the Academy and returned to Nizhny Novgorod, where he designed a method of sailing upstream and built a ship which he had started to design back in 1782. Tests indicated that such ships were indeed feasible, but they were never used. During the same time, Kulibin had projects on using steam engines to move cargo ships, on creating salt mining machines, different kinds of mills, pianos and other projects. Kulibin died in 1818 after spending his last years in poverty.

The International Astronomical Union’s Minor Planet Center has named an asteroid in Kulibin’s honor: 5809 Kulibin.

Exercise 9. Read the list of Kulibin’s life events below the text. Put the events into the order they happened.

- A** Born in Nizhny Novgorod
- B** Built a lantern able to emit a powerful light using a weak light source
- C** Designed a method of sailing upstream
- D** Settled again in Nizhny Novgorod
- E** Assigned to be in charge of the mechanical workshop in the Academy of Sciences of Saint Petersburg
- F** Constructed a push-cycle cart
- G** Worked on creating salt mining machines, different kinds of mills, pianos and other projects
- H** Moved to Saint Petersburg
- I** Constructed an elevator that lifted a cabin using screw mechanisms
- J** Built an egg-shaped clock with a complex automatic mechanism
- K** Died in 1818

Exercise 10. Answer the questions about Kulibin.

1. When and where was Kulibin born?
2. What became his special interest?
3. When did Kulibin build an egg-shaped clock?
4. Where did Kulibin build a “planetary” pocket-clock? What did they show?
5. What invention was used industrially for lighting workshops, lighthouses, ships?
6. Where did he use a flywheel, a brake, a gearbox and roller bearing?
7. What other inventions did Kulibin do?
8. Why did he return to Nizhny Novgorod?
9. When did Kulibin die?
10. What was named in his honor?

Exercise 11. Read the text about Ivan Kulibin again and get ready to speak about him.

Exercise 12. Read the following dialogue and get ready to act it out.

A Visit to a Factory

Mr. Nikitin, an inspector of Techmachimport, arrived *in Manchester*. He was to inspect the compressors under their order and take part in the tests in accordance with the arrangements between Mr. Kozlov and Mr. Lipman.

Mr. Collins, Sales Manager of Goodman and Co., met him at the station. While they were walking along the platform Mr. Collins told Mr. Nikitin that everything was ready for inspection and the Chief Engineer of the factory was expecting him in the afternoon. Mr. Collins brought Mr. Nikitin to the Ambassador Hotel where they had reserved a room for him. They arranged to meet in two hours.

At the Testing Department of the Factory

Collins Mr. Nikitin, this is our Chief Engineer, Mr. Jones.

Nikitin How do you do, Mr Jones?

Jones How do you do, Mr Nikitin. I'd like to tell you that we've already started testing the compressors. The preliminary tests show that the compressors meet all your technical requirements.

Nikitin Very good. But I'd like you to make a *few* temperature *tests* if possible.

Jones This is just what we're going to do now.

(After the tests ...)

Nikitin I think, Mr. Jones, there are some defects in the motor. The quality of

the insulation isn't quite up to standard.

Jones Isn't it? Then we'll try and do our best to improve it.

Nikitin I'd like you to. I hope it won't cause any delay in shipment.

Jones No, I think we'll be able to ship the compressors without delay. Now we are a little ahead of schedule and it won't take us more than 3 or 4 days to eliminate the defects.

Nikitin That's fine.

Jones Is there anything else you want us to change?

Nikitin No, nothing but the insulation. The rest is all right. I'm pleased with the results of the tests. Thank you.

Exercise 13. Find in the text the equivalents to the following sentences.

1. Он должен был проверить компрессоры по их заказу.
2. Главный инженер ожидал г-на Никитина днем.
3. Они условились встретиться через два часа.
4. Компрессоры отвечают всем техническим требованиям.
5. Если возможно я бы хотел провести несколько температурных испытаний.
6. Это как раз то, что мы собираемся сейчас делать.
7. Качество изоляции не совсем соответствует стандарту.
8. Мы постараемся сделать все возможное, чтобы улучшить ее (изоляцию).
9. Мы сможем отгрузить компрессоры без задержки.
10. Мы опережаем график работы.
11. Я доволен результатами испытаний.

Exercise 14. Answer the questions and make a short story.

1. Whom is it necessary to make arrangements with if you want to visit a plant?
2. Why do the representatives of the buyers usually make arrangements about a visit to the plant?
3. Why do they try to take part in the tests of the machines which they buy?
4. In accordance with what instructions do the representatives of the sellers test the machines?
5. Whom do you usually discuss the results of the tests with?
6. Have you made arrangements to visit a plant?
7. What are you going to inspect?
8. Who has given you the necessary instructions?
9. What does your Chief Engineer expect you to do at the plant?

UNIT THREE

METALWORKING. FORMING AND CUTTING

PRONUNCIATION AND VOCABULARY EXERCISES

Exercise 1. Read the following words. Pay attention to the pronunciation of the consonants and their combinations. Can you give more word examples?

- [θ] think, throw, third, fifth, thin, teeth
- [ð] though, those, this, that, with, without
- [ʒ] usual, vision, measure, pleasure, decision
- [dʒ] Jam, Jim, Jane, January, George, badge
- [ʃ] ship, sheep, shoe, shop, share, finish
- [tʃ] cheese, chess, culture, fetch, match, chair
- [v] – very well, very wet, wet weather, win victory, warm wind,
- [w] white vase, violet whale, wise Wilde, wide valley
- [ŋ] think, thing, thank, interesting, building, engineering
- [h] his, her, high, hat, horse, hill, house, hope, husband

Exercise 2. We can make nouns, adjectives and verbs negative by using certain prefixes. Form nouns using the prefixes and translate them. Can you give more word examples?

- un*– to pack, tidy, fair, employed, kind, happy, expensive, important
- im*– polite, modest, perfect
- in*– efficiency, correct
- il*– legal, literate
- ir*– relevant, responsible, replaceable
- dis*– to agree, to like, to appear, an advantage, to connect, loyal, to arm
- non*– sense

Exercise 3. What are the prefixes used in the following words? Translate the words. Can you give more word examples?

To disqualify, uncomfortable, post-graduate, an ex-husband, a submarine, pseudo-scientific, a bicycle, a tricycle, a unicycle, monotonous, to mistranslate, to underpay, to overeat, pro-government, anti-war, to rewrite, multi-media

Exercise 4. Make new words with the base words using the suffixes and/ or the prefixes. Sometimes the spelling change is necessary. Translate the words you get.

prefix	base word	suffix
<i>il-</i>	legal	<i>-al</i>
<i>inter-</i>	nation	<i>-ly</i>
	global	<i>-ment</i>
	active	<i>-ive</i>
	equip	<i>-ity</i>
	profession	<i>-tion</i>
	product	<i>-ious</i>
	relative	<i>-ate</i>
	compensate	
	govern	
	industry	
	aggressive	
	origin	

Exercise 5. Here are some words and expressions that you will come across in the texts of the unit. Study them carefully.

nouns and gerunds		nouns and gerunds	
blacksmith	кузнец	precision	точность, четкость
centering	центрирование, отметка кернером	profitability	прибыльность, рентабельность
chamfering	тех. скос, фаска	running of	работа завода
cycle	тех. (круговой) про- цесс, такт	the plant	
deburring	удаление заусенцев; снятие облоя;	sawing	распиливание, пила
drilling	сверление; бурение	threading	резьбонарезывание
facing	обточка (поверхности)	turning	обточка; вращение
filing	опиливание	verbs	
fixture	арматура	be at	занимать
forefront	передний план	the core of	ключевое положение
grinding	шлифование	meet	удовлетворять (требования)
lathe	токарный станок	pour	лить, заливать
milling	фрезерование	adjectives	
objective	цель	ductile	пластичный
ore	руда	malleable	ковкий
		net	чистый; нетто

adjectives and participles		adverb	
sophisticated	сверхсложный	wherein	здесь: посредством
vital	важный, существенный		которого

READING AND COMPREHENSION EXERCISES

Exercise 1. Read the following text and translate it.

Metalworking is the process of working with metals to create individual parts, assemblies, or large scale structures. The term covers a wide range of work from large ships and bridges to precise engine parts and delicate jewelry. It therefore includes a correspondingly wide range of skills, processes, and tools.

Metalworking is a science, art, hobby, industry and trade. Its historical roots span cultures, civilizations, and millennia. Metalworking has evolved from the discovery of smelting various ores, producing malleable and ductile metal useful for tools and adornments. Modern metalworking processes, though diverse and specialized, can be categorized as forming, cutting, or joining processes. Today's machine shop includes a number of machine tools capable of creating a precise, useful workpiece.

The *forming* processes modify metal or workpiece by deforming the object, that is, without removing any material. Forming is done with heat and pressure, or with mechanical force, or both.

Casting achieves a specific form by pouring molten metal into a mold and allowing it to cool, with no mechanical force. *Plastic deformation* involves using heat or pressure to make a workpiece more conductive to mechanical force. Historically, this and casting were done by blacksmiths, though today the process has been industrialized. *Sheet metal forming* involves the application of mechanical force at room temperature.

Cutting is a collection of processes wherein material is brought to a specified geometry by removing excess material using various kinds of tooling to leave a finished part that meets specifications. The net result of cutting is two products, the waste or excess material, and the finished part. If this were a discussion of woodworking, the waste would be sawdust and excess wood. In cutting metals the waste is chips or swarf and excess metal.

There are many technologies available to cut metal, including:

- Manual technologies: saw, chisel, shear or snips;
- Machine technologies: turning, milling, drilling, grinding, sawing;
- Welding / burning technologies: burning by laser, oxy-fuel burning, and plasma;
- Erosion technologies: by water jet or electric discharge.

Exercise 2. Answer the following questions about the text.

1. What is metalworking?
2. What is the range of work that the term “metalworking” covers?
3. Is metalworking a science or an art?
4. What has metalworking evolve from?
5. How can modern metalworking processes be categorized?
6. What does forming do?
7. What is forming done with?
8. Which forming process(es) involve(s) no mechanical force?
9. Which forming process(es) involve(s) no heat or pressure?
10. Which forming process(es) was (were) done by blacksmiths?
11. What is cutting?
12. What two products are the net result of cutting?
13. What is the the waste in woodworking?
14. What is the the waste in metalworking?
15. What technologies are available to cut metal?

Exercise 3. Complete the sentences with the information from the text.

1. Metalworking is the process of working with metals to create
2. The term includes a wide range of
3. Metalworking has evolved from the discovery of smelting ... , producing ... useful for
4. Modern metalworking processes can be categorized as
5. ... modify metal or workpiece by deforming the object, that is, without removing any material.
6. ... modify metal by pouring molten metal into a mold and allowing it to cool, with no mechanical force.
7. ... modify metal by removing excess material using various kinds of tooling to leave a finished part that meets specifications.
8. The net result of cutting is two products,
9. If this were a discussion of woodworking, the waste would be
10. In cutting metals the waste is

Exercise 4. Find in the text the English equivalents for the following Russian words and phrases.

Процесс работы с металлами; отдельные части, узлы, крупномасштабные конструкции; точные части двигателя; хрупкие драгоценности; охватывать культуры, цивилизации и тысячелетия; плавка различных руд; полезный для инструментов и украшений; разнообразные и специализированные; способный к; изменять металл или заготовку; литой металл; про-

цесс был промышленно развит; при комнатной температуре; удаляя излишки материала; чтобы соответствовать техническим требованиям; конечный результат; деревообработка.

Exercise 5. Find in the text the following English words and phrases and give their Russian equivalents.

The term covers; a wide range of work; a correspondingly wide range of skills, processes, and tools; a science, art, hobby, industry and trade; can be categorized as; a number of; that is; is done with; with no mechanical force; the application of mechanical force; a collection of processes; available.

Exercise 6. In the table below you will see some other, not mentioned in the text above, metal forming processes listed. Match the name (1-4) with the definition (A-D), and with the corresponding Russian term (a-d).

1 rolling	A it includes such processes as punching, blanking, embossing, bending, flanging, and coining	a ковка
2 stamping	B in it the metal stock is passed through a pair of rolls	b прокатка
3 drawing	C in it the metal is heated in fire and hit with a hammer	c волочение
4 forging	D it uses tensile forces to stretch metal	d штамповка

Exercise 7. Match the name of a tool used to cut metal (1-6) with the definition (A-F), and with the corresponding Russian term (a-f).

1 saw	A a tool capable of slicing into metal or other materials (such as granite) using a jet of water at high velocity and pressure, or a mixture of water and an abrasive substance	a ножницы для резки металла
2 laser	B a tool used to give material a desired shape; material is removed from the workpiece by a series of rapidly recurring current discharges between two electrodes, separated by a dielectric liquid and subjected to an electric voltage	b зубило
3 electric discharge	C a tool that uses a hard blade or wire with an abrasive edge to cut through softer materials; may be worked by	c установка гидроабразивной рез-

	hand		ки
4 chisel	D a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons	d	аппарат для электроэрозионной обработки
5 shear or snips	E hand tools used to cut sheet metal and other tough webs. There are two broad categories: tinner's snips, which are similar to common scissors, and compound-action snips, which use a compound leverage handle system to increase the mechanical advantage	e	пила
6 water jet	F a tool with a characteristically shaped cutting edge (such that wood ones have lent part of their name to a particular grind) of blade on its end, for carving or cutting a hard material such as wood, stone, or metal	f	лазер

Exercise 8. Read the following text. Seven sentences have been removed from it. From the sentences below (A-J) choose the one which fits the appropriate gap (1-7). There is one extra sentence you do not need.

Conventional *machining* is a collection of material-working processes in which power-driven machine tools, such as saws, lathes, milling machines, and drill presses, are used with a sharp cutting tool to mechanically cut the material to achieve the desired geometry. 1. _____

_____. A person who specializes in machining is called a machinist. A room, building, or company where machining is done is called a machine shop. Much of modern day machining is controlled by computers using computer numerical control (CNC) machining. Machining can be a business, a hobby, or both.

2. _____
 _____. During the Machine Age, it referred to (what we today might call) the "traditional" machining processes, such as turning, boring, drilling, milling, broaching, sawing, shaping, planing, reaming, and tapping, or sometimes to grinding. Since the advent of new technologies such as electrical discharge machining, electrochemical machining, electron beam machining, photochemical machining, and ultrasonic machining, the retronym "conventional machining" can be used to differentiate the classic technologies from the newer ones.

3. _____
_____.

Turning is a metal cutting process for producing a cylindrical surface with a single point tool. The workpiece is rotated on a spindle and the cutting tool is fed into it radially, axially or both.

4. _____
_____. Producing surfaces using both radial and axial feeds is called profiling.

There are many *threading* processes including: cutting threads with a tap or die, thread milling, single-point thread cutting, thread rolling and forming, and thread grinding. 5. _____
_____.

Grinding uses an abrasive process to remove material from the workpiece. A grinding machine is a machine tool used for producing very fine finishes, making very light cuts, or high precision forms using an abrasive wheel as the cutting device. 6. _____
_____.

Filing is combination of grinding and saw tooth cutting using a file. Prior to the development of modern machining equipment it provided a relatively accurate means for the production of small parts, especially those with flat surfaces. 7. _____
_____.

_____. Today filing is rarely used as a production technique in industry, though it remains as a common method of deburring.

- A** Machining is a part of the manufacture of almost all metal products, and it is common for other materials, such as wood and plastic, to be machined.
- B** Producing surfaces perpendicular to the workpiece axis is called facing.
- C** This wheel can be made up of various sizes and types of stones, diamonds or inorganic materials.
- D** The precise meaning of the term “machining” has evolved over the past 1.5 centuries as technology has advanced.
- E** A *tap* is used to cut a female thread on the inside surface of a pre-drilled hole, while a *die* cuts a male thread on a preformed cylindrical rod.
- F** An unfinished workpiece requiring machining will need to have some material cut away to create a finished product.
- J** The term “machining” without qualification usually implies conventional machining.
- H** The skilled use of a file allowed a machinist to work to fine tolerances and was the hallmark of the craft.

Exercise 9. Choose the right ending.

1. A room, building, or company where machining is done is called

- A** a machine mall.
 - B** a machine boutique.
 - C** a machine shop.
2. A person who specializes in machining is called
- A** a machinist.
 - B** a mechanic.
 - C** a machine-gunner.
3. Producing surfaces using both radial and axial feeds is called
- A** facing.
 - B** profiling.
 - C** deburring.
4. Filing is combination of grinding and saw tooth cutting using
- A** an abrasive wheel.
 - B** a file.
 - C** a tap or die.

GRAMMAR EXERCISES

Exercise 1. Translate the following noun chains.

- | | |
|--|---|
| 1. engineering disciplines | 30. one-way ticket |
| 2. trade talks | 31. new-look Moskva-city project |
| 3. product lifecycle management | 32. Moscow Interbank currency exchange |
| 4. power station equipment | 33. the April-September 1958 period |
| 5. heating and cooling systems | 34. the first quarter production figures |
| 6. many mechanical engineering science disciplines | 35. the month-long 1956 steel strike |
| 7. coal supply situation | 36. the 1959-1960 world coffee crop |
| 8. home and overseas prices | 37. a government-assisted agricultural project |
| 9. London metal exchange copper price | 38. bronze age |
| 10. post Second War prices | 39. Latin American coffee growing countries |
| 11. maximum home trade iron and steel prices | 40. the Russian ship purchasing mission |
| 12. import restrictions | 41. the better-than-expected 1950-1960 cocoa crop |
| 13. October exports | 42. the in fact three-dimensional problems |
| 14. oil difficulties | 43. deep sea current measuring device |
| 15. the year-end position | |
| 16. post devaluation conditions | |
| 17. the might have been tragedy | |

- | | |
|--|--|
| 18. the have been Muscovite | 44. knowledge-based export system |
| 19. the can do man | 45. the knowledge acquisition facility |
| 20. natural rubber production | 46. database management system |
| 21. the economic stabilization measures | 47. high voltage direct current |
| 22. fatigue life | 48. sodium chloride molecules |
| 23. India's acute foreign situation | 49. defense industry reform |
| 24. payment agreement | 50. transport safety measures |
| 25. coal mining | 51. state customs committee |
| 26. "be kind to animals" week | 52. aircraft engines |
| 27. command message parameters | 53. surface-to-air missile system |
| 28. the Microsoft foundation class library application framework | 54. information-baring laser beams |
| 29. boat building | 55. large-capacity high-speed computer |

Exercise 2. Translate the following noun chain pairs.

application server – server application
 call program – program call
 call library – library call
 array cell – cell array
 character identification – identification character
 data group – group data
 library program – program library
 bank credit – credit bank
 construction firm – firm construction
 consumption fund – fund consumption
 law firm – firm law
 business world – world business
 world market – market world
 quality standard – standard quality
 equipment safety – safety equipment
 sales discount – discount sales

Exercise 3. Translate the following phrases making up noun chains with the words suggested.

- поперечное сечение ткани
section tissue cross
- спектр эмиссии молекул
molecular spectrum emission
- энергия электрона с пульсирующей амплитудой
pulse electron energy amplitude

4. коэффициент сильной абсорбции
strong coefficient absorption
5. орбитальные научно-исследовательские станции долговременного действия
term orbital station long research
6. долговременное сотрудничество в области науки и техники
term long cooperation technical scientific
7. генератор переменного тока
generator alternating current
8. мощность ГЭС
plant power water
9. станция перекачки природного газа
station gas natural transmission
10. вычислительные машины непрерывного действия
action computers continuous
11. программное обеспечение для коллективной работы
collaboration software group
12. запасы топлива всего мира
world's resources entire fuel
13. индексы цен на товары массового потребления
price index consumer
14. совокупный общественный продукт
product national gross
15. 5 % скидка за покупку большого количества товаров
quantity discount 5 per cent
16. Московская центральная фондовая биржа
Stock Moscow Central Exchange

Exercise 4. Make questions from the following statements, asking about the words in italics.

1. Metalworking is the process of working with metals *to create individual parts, assemblies, or large scale structures*.
2. *Metalworking* includes a correspondingly wide range of skills, processes, and tools.
3. Metalworking is *a science, art, hobby, industry and trade*.
4. Modern metalworking processes can be categorized as *forming, cutting, or joining* processes.
5. *The forming processes* modify metal or workpiece without removing any material.
6. *Sheet metal forming* involves the application of mechanical force at room temperature.

7. Cutting is a collection of processes wherein material is brought to a specified geometry *by removing excess material using various kinds of tooling to leave a finished part that meets specifications.*
8. *If this were a discussion of woodworking,* the waste would be sawdust and excess wood.
9. There are *many* technologies available to cut metal.

Exercise 5. Translate the sentences paying attention to the participle use.

1. The Ukraine Hotel is a winner of competitions conducted by the Moscow city government.
2. An airplane designed by Paul McCready crossed the English Channel in 1979, followed by a solar-powered airplane.
3. The electronic car will lead to other forms of technology being used for transportation.
4. Friendship is like money, easier made than kept.
5. A rolling stone gathers no moss.
6. The discovery made is of great value.
7. We heard the dam blown up.
8. He had his flat redecorated.
9. If changed, the article will be published.
10. All of them watched the sunken ship being raised.
11. I heard the news being announced.
12. Money saved is money gained.
13. A trouble shared is a trouble halved.
14. Looked at from a different angle, the problem did not seem very difficult.
15. He saw her coming up.
16. While looking through the documents he found several errors.
17. The data being calculated by them are very important.
18. Having tested the new device we started our experiment.
19. When heated to a high t° any body becomes a source of light.
20. Friendship restored, we walked along together.

Exercise 6. Translate the sentences paying attention to the gerund use.

1. Engineers do their best to save fuel by making generators efficient and they also keep searching for possible sources of energy to increase existing stocks.
2. By pumping ionized gas at high speed through magnetic field we can generate current in the gas.
3. The gas must be heated to over 2000°C and this raises a problem of devising materials capable of withstanding such intense heat.
4. The most convenient material for achieving fusion is deuterium.

5. Scientists and technologists are hard at work trying to find ways of using deuterium in the laboratory.
6. No one developed a practical way of converting wind into power until the invention of the windmill.
7. Solar batteries have proved to be very useful in supplying current for rural telephone systems.
8. When fitted into satellite, solar batteries provide the power for sending radio signals back to the earth.
9. Concrete is made by mixing together small stones, sand, cement and water in rotating drums.
10. The less water is used in mixing the concrete, the denser and stronger it is.

Exercise 7. Give the five types of questions for each of the following sentences.

1. Metalworking is a science, art, hobby, industry and trade. Its historical roots span cultures, civilizations, and millennia.
2. Grinding uses an abrasive process to remove material from the workpiece.
3. As an engineer, I would have greater opportunities of serving my motherland than in any other capacity.

SPEECH EXERCISES

JOB. MY SPECIALITY. MY FUTURE PROFESSION. THE JOB INTERVIEW. POLITENESS FORMULAS

ИНЖЕНЕР?!... Этот открыто светящийся интеллект, этот свободный и необидный юмор, эта легкость и широта мысли, непринужденность переключения из одной инженерной области в другую и вообще от техники – к обществу, к искусству. Затем – эту воспитанность, тонкость вкусов: хорошую речь, плавно согласованную и без сорных словечек; у одного – немножко музицирование; у другого – немножко живопись; и всегда у всех – духовная печать на лице...

Exercise 1. What will these scientists study? Match 1-7 with A-G.

- 1 physicist
- 2 biologist
- 3 ecologist

- A rocks
- B substances
- C stars

- | | | | |
|---|---------------|---|--------------------|
| 4 | chemist | D | the environment |
| 5 | mathematician | E | living things |
| 6 | geologist | F | matter and energy |
| 7 | astronomer | G | numbers and shapes |

Exercise 2. Read the texts (1-6) and match them with the names of the jobs (a-g). There is extra one job name.

actor vet astronomer meteorologist astronaut shop assistant singer

1. People of this profession already save thousands of lives every year in Florida, Mexico, East Asia and other places when they warn people to evacuate their homes in good time to get out of the way of a hurricane or a storm.
2. Any dog owner knows that his or her dog can eat its 24-hour energy need in just a few minutes at a single meal. Both cats and dogs need to be offered a lot of fresh water and cat owners need to take special care to encourage their pets to drink.
3. Portraying Frodo in the *Lord of the Rings* Elijah Wood had a big problem – his costume. He had to get up at five o'clock every morning to put on Frodo's feet and ears.
4. When you go to fish-n-chips, they will ask you this question: open or wrapped? This is because British people eat their take-away chips in paper. If you want to eat your chips in the street, ask for them to be "open". If you want to take them home ask for them "wrapped".
5. His fun lyrics showed that rapping doesn't always have to be about street violence and crime. Not long ago he criticized other rappers for encouraging children to use incorrect English. He's very intelligent and he first wanted to go to university but changed his mind and decided to make music instead.
6. In March, 2004 a new planet was discovered 10 billion kilometers from Earth and was named Sedna. The news was especially exciting because the planet was found beyond what was understood to be the edge of the planetary solar system.

Exercise 3. Below is a list of personal qualities. What jobs suit people who have these qualities? Explain your choice.

Example: I think a mechanic should have an ability to work with his hands and physical strength. He also needs some interest in sciences.

- | | |
|-------------|--------------------|
| imagination | good memory |
| patience | good ear for music |

tolerance	good social skills
kindness	an ability to study hard
creativity	an ability to work with one's hands
courage	an ability to work with one's brain
quick reactions	an ability to express yourself clearly
physical strength	being a leader
interest in sciences	
interest in arts	
interest in the natural world	

Exercise 4. a) From the verbs in the box below form the nouns to denote various jobs and professions using the suffixes, *-er / -or / -ist*.

type	sail	journal	run	drive	direct	paint	art	guitar	teach	dance
------	------	---------	-----	-------	--------	-------	-----	--------	-------	-------

b) Use the names of the jobs from part a) to complete the sentences.

1. We have a wonderful maths _____ at school. That's why I like the subject.
2. My brother plays different musical instruments, but I can't call him a _____ or a drummer.
3. Don't like to be in John's car when he drives. He is such a careless _____.
4. Maya Plisetskaya is a brilliant Russian ballet _____.
5. Richard is a talented film _____, but his last film was not a success.
6. Someone who works on a boat or a ship is a _____.
7. If you want to become a _____ you need to enter a university and have some works published.
8. I think we need a new _____ Miss Clark makes so many mistakes in the documents.
9. Leonardo da Vinci was not only a famous _____, he was also an inventor and scientist.
10. The general sent a _____ from Marathon to Athens to carry the news.

Exercise 5. Read the letter below and try to speak about your own dreams and ambitions in the field of engineering.

My Dear Friend,

I have just received your letter. It is always a pleasure for me to hear from a dear friend like you, whom I have not met for such a long time.

You have asked me about my dreams and ambitions. Every person has their own desires, and their own aims for the future, some people run after worldly wealth. They become doctors so that within only a few years they may have cars and big “kothies”. Others are ambitious for position and power. They try to seek government jobs and become officers. I, for one, have no such ambitions. My ambition in life is to become an engineer and serve my motherland in that capacity.

There are various reasons for having engineering as my ambition in life. I feel that as an engineer, I would have greater opportunities of serving my motherland than in any other capacity. Russia has to be on the road to economic development. Much has been done, but much more still remains to be done. Our economic development has not been as rapid as it should have been. It is mainly the birth of qualified engineers that can ensure the progress of the country. There is urgent need of engineers for the country. So, I feel that I should be an engineer and do my bit for my nation.

Exercise 6. Read and translate the text below.

Engineering

1. Engineering is the professional art of applying science to the optimum conversion of the resources of nature to the uses of mankind. The word engineer is derived from the Latin root *ingenere*, which means “to create”. The engines of war were devices such as catapults, floating bridges, and assault towers; their designer was the “engineer”, or military engineer. The counterpart of the military engineer was the civil engineer, who applied essentially the same knowledge and skills to designing buildings, streets, water supplies, sewage systems, and other projects.
2. The function of the scientist is to know, while that of the engineer is to do. The scientist adds to the store of verified, systematized knowledge of the physical world; the engineer brings this knowledge to bear on practical problems. Engineering is based principally on physics, chemistry, and mathematics and their extensions into material science, solid and fluid mechanics, thermodynamics, transfer and rate process, and systems analysis.
3. Unlike the scientist, the engineer is not free to select the problem that interests him; he must solve problems as they arise; his solution must satisfy conflicting requirements. Usually efficiency costs money; safety adds to complexity; improved performance increases weight. The engineering solution is the optimum solution, the end result that is most desirable. It may be the most reliable within a given weight limit, the simplest that will satisfy certain safety requirements, or the most efficient for a given cost. In many engineering problems the social costs are significant.

4. Engineers employ two types of natural resources – materials and energy. Materials are useful because of their properties: their strength, ease of fabrication, lightness, or durability; their ability to insulate or conduct; their chemical, electrical, or acoustical properties. Important sources of energy include fossil fuels, wind, sunlight, falling water, and nuclear fission. Since most resources are limited, the engineer must concern himself with the continual development of new resources as well as the efficient utilization of existing ones.

Exercise 7. Re-read the text and determine if the following statements are:

- true
- false
- of no information in the text.

1. Engineers employ material resources because they are unlimited.
2. Thermodynamics is one of the basic parts of engineering.
3. Many engineering solutions should take into account social costs.
4. The quality of work of a mechanical engineer is continually rising.

Exercise 8. Indicate which part of the text (1, 2, 3, or 4) the following information corresponds to:

1. differences in the functions of scientists and engineers.
2. the origin of the term “engineer” and its meaning.

Exercise 9. Answer the question about the text.

What is meant by “engineering solution”?

1. The solution is considered to be engineering if only engineers take part in solving arising problems.
2. The solution is considered to be engineering if it suggests applying new technological methods of production.
3. The solution is considered to be engineering if it is reliable no matter how heavy it is.
4. The solution is considered to be engineering if it satisfies the requirements of efficiency, reliability and simplicity in the cheapest way possible.

Exercise 10. Read the text again and determine its main idea.

1. Functions of the engineering and engineers.
2. Engineering is the professional art of applying science to the uses of mankind.
3. Engineering solution must satisfy conflicting requirements.

4. The engineer must concern himself with the continual development of new resources.

Exercise 11. Read the following statement from the text below.

Mechanical engineers are at the core of production. Without them production would be impossible.

Do you agree with this statement? Why? Read the text and find out if you are right.

Demand for qualified mechanical engineers is high

Mechanical engineers have a wide range of job opportunities. They may be management, sales, development, research, or design or production engineers in industries such as food, steel, chemical and heavy and light engineering. They also can work in service industries such as transport and gas, water, and electricity.

Mechanical engineers are vital to the running of plants. Without them production would be impossible. Each plant is likely to be different. Some are large, some are small and most are complex. The main operational objectives of safety, efficiency and profitability are common to them all and demand a range of technical and personal skills from the engineers.

Mechanical engineers are concerned with machines, mechanisms and energy conversion. Mechanical equipment is at the core of the plants. Each plant is different from the next: the machines are particular to the process involved in making the end product and mechanical engineers are involved in their design, building and operation. They are at the forefront of technology: pressing the limits of material capability, developing new materials of construction, specifying complex machines and doing all of this with the most sophisticated design techniques.

Mechanical engineers' jobs are demanding and exciting. Their skills, technical and managerial, are used to the fullest. In plant operation the job is to keep the plant running and stimulate the team to make better use of equipment to improve performance.

Mechanical engineers are at the core of production: they manage plant and equipment, they manage people. In fact, they manage our future.

Exercise 12. Read the following text. Is it about your specialty, technology of machine design.

I am a second-year student of Machine-Building Department of Tver State Technical University. My specialty is technology of machine design.

Technology of machine design is a subject which studies processes of machine parts. Machining deals with the usage of different kinds of complex equipment such as: various machines, cutting instruments, all kinds of devices, fixtures, adapters, etc.

The subject of technology of machine design is taught at special technical higher schools and at our University, too. Almost all sorts of machines, mechanisms, machine-tools, instruments and apparatus are manufactured in our country including modern high-precision machine tools, giant turbogenerators, electronic computers, atomic reactors, various automatic devices and other equipment.

Students of the machine-building department must know modern machines, cutting tools and special equipment which is used to perform machining operations. An engineer working in this field of science should work out new types of production. These machines may be designed for operations on a fully automatic cycle. They may have special equipment including control. These machines can be used to perform not one but many operations at once: milling, sawing, centering, facing, chamfering, drilling, turning, etc.

Automation of all industrial processes is of great importance at today's stage of the development of engineering. The number of automatic plants in our country is growing and will continue to grow.

So much can be said about the development of our machine-building industry. I can only add that my specialty is extremely interesting and I shall master it successfully, I'm sure.

Exercise 13. Answer the questions.

1. What is your specialty?
2. What does the subject of technology of machine design study?
3. Where is the subject of technology of machine design taught?
4. What sorts of machines are manufactured in our country?
5. Why must students of machine-building department know modern machines?
6. What operations can be performed at once?
7. What should engineers do to develop machine-building industry?

Exercise 14. Read the text again and be ready to speak about your speciality.

Exercise 15. Read the dialogue "At a Plant" and be ready to reproduce it.

Two students meet in the factory grounds of a plant. One, Ivan, is a second-year student, the other, Boris, an undergraduate. They shake hands and start talking.

Ivan Hello, Boris! I didn't expect to meet you here. I thought you were going to have your pre-diploma practice in Moscow.

Boris I am going to Moscow in a day or two, but I have to collect some material here, in the design office of this plant. And what are you doing at the plant?

Ivan You see, I've joined the SNTO of our faculty. I have been asked to organize an excursion to this plant and to get ready to give the students a general description of the plant at our next sitting. A detailed description of shops and processes will be given by the chief processing engineer during our excursion. I've just spoken to him.

Boris Well, what shops have you seen?

Ivan First, I went to the foundry. As foundry is my speciality.

Boris Is it? I thought you were studying forging and pressing, same as I. So, what have you seen in the foundry?

Ivan I made a tour of its major departments: sand casting, mould casting, die casting, precision casting, and centrifugal casting.

Boris You seem to have forgotten one more department. I remember having my first industrial training there, namely investment casting.

Ivan I haven't forgotten anything. I didn't mention it because the method is closely related to precision casting.

Boris I think the students will get interested in mould casting and die casting.

Ivan May be you are right. Mould casting is a high-speed method by which at least 500 castings can be made from a single mould and the number may be even higher, depending upon the metal being cast.

Boris And what are you going to tell them about die casting?

Ivan First of all, that in this process the molten metal is forced into a permanent mould under pressure, the mould consisting of two parts. Then I'll tell them that the method is particularly good for casting non-ferrous alloys. The engineer will show them the casting machine and explain the whole process in detail.

Boris And who will tell the students about forging, pressing and stamping?

Ivan The engineer will. He said he would show us the new press line for cold-sheet stamping and the automatic forging set-ups. He said that these forging set-ups consist of mechanical and hydraulic presses integrated by automatic material handling devices. I have never seen such set-ups.

Boris This is the most advanced technology. I'm going to do my diploma project on this very subject. I could tell you a lot of interesting things about it, when we meet in autumn.

- Ivan** Good. What do you think, Boris, about the assembly shop? I, personally, was greatly impressed by it! I have never thought that a shop working in three shifts could be so clean! Besides, it seems to be very quiet, as compared to the other shops, despite everything being on the move. (*Looking at his watch*) I must be running now. Good-bye!
- Boris** Good luck!

Exercise 16. You are going to read part of a leaflet prepared by a large employment agency. It gives advice on what to do and what not to do at interviews. Choose the most suitable headings from the list A-F for each part (1-5). Notice that there is one heading which you do not need to use.

- A** “What did you leave your last job?”
- B** What else should you do during the interview?
- C** “What did you do in your last job?”
- D** How should you prepare for the interview?
- E** “Why do you want to work for us?”
- F** What questions should I ask my interviewers?

1 _____

- Find out as much as you can about your prospective employers and the business they are in. think about the questions you are most likely to be asked, and at least three questions you would like to ask them. Then make sure you arrive for the interview at least fifteen minutes early. Here, by the way, are four of the most frequent questions interviewers ask. Think calmly about them while you are waiting.

2 _____

- Don't just give the name of the job. Describe the main duties and responsibilities the job involved. Then pause and see if your interview has any further questions.
- Be as positive as possible. Emphasize all the things you learned that you think will be useful in the new job. Be sure to mention any promotion or advancement you had.

3 _____

- Never say “It was boring”. Instead, say that you didn't think you could make use of your full abilities. Don't criticize your previous employer. If you lost your job through no fault of your own, briefly describe the problems the company had. Never give you prospective employers the impression that you are bitter.

4

-
- Don't talk only about what you hope to get from the firm. Emphasize what you think you can do for them and all the things in your previous experience and training that you think will be useful in the new job. Be sure also to mention something you have learned about your prospective employers that impressed you.

5

-
- Relax. Be yourself.
 - Look at your interviewer when he or she asks you questions.
 - If you don't understand a question, politely say "I'm not sure if I understand. Do you mean ..."
 - Remember the questions you would like to ask. Be sure to ask at least one or two before the interview is over.
 - At the end, thank your interviewers for seeing you.

Exercise 17. Read the sample job interview for students and recent graduates and be ready to answer the same questions.

Why did you select your University?

I chose to go to a university because I like being part of a large group. The world is a big place, just as my university, and the parallels between the two will better help prepare me for post- university life. Also, my university has a really strong school of sciences and I wanted to study under the best minds in the country.

Describe your most rewarding college experience.

My most rewarding university experience occurred even before I arrived on campus as a freshman. Two weeks prior to orientation day, the university offered an "outward bound" program that first year students could participate in. During those two weeks, I overcame fears, made life long friends, and gained the self-confidence I needed to start my university journey.

If I were to ask your professors to describe you in three words, what would they be?

Sharp, intellectual, humorous.

What was your greatest strength as a student?

I enjoy working in large and small groups because I love the different ideas that are generated, as well as the quality of work you can create, when multiple brains work together.

How has your college experience prepared you for a career?

I learned a lot about myself during my four years in university. I faced challenges that I never thought I would come across and in turn, I have become more confident.

Tell me about your work experience? How has it prepared you for a career?

I've had a job every summer since I was 16 years old. My primary reason to work was to have some extra spending money, but what I didn't realize was that I was actually sampling careers to see where I fit in. I worked as a mechanical engineer assistant at a local artificial fibre combine during the summer before my freshman year of University. It was then that I discovered what I wanted to do for my career. I decided I would go to the University and focus on becoming a mechanical engineer and that's what I did. I have been working in the same combine ever since.

How do you plan to overcome your weakness?

One of my greatest strengths – and a weakness – is my passion for what I am doing. For example, while in the university, I had a variety of courses at the same time and had more of an interest in one than the other. I sometimes caught myself paying more attention to one over the other which is apparent in the end results.

What unique attributes can you bring to this company and position?

My strongest attribute is my determination. I take on every challenge head-on and do what I need to accomplish my goals, even when the challenge is difficult.

Exercise 18. We use certain expressions in different social situations. Match the following expressions and responses. When do we use these expressions? Translate them into Russian.

How are you?	Sleep well!
Hello, Jane!	Yes. Can I help you?
How do you do?	Good morning!
See you tomorrow!	Fine, thanks.
Good night!	Pleased to meet, Ela.
Good morning!	Not at all. Don't mention it.
Hello, I'm Ela Paul.	Thanks.
Cheers!	Same to you!
Excuse me!	That's very kind. Thank you.
Bless you!	Bye!
Have a good weekend!	How do you do?
Thank you very much indeed.	Hi, Peter!
Make yourself at home.	Cheers!

Exercise 19. How polite are you? In the following quiz choose the right answer.

a)

You are on a bus. The person next to you is playing loud music. What do you say?

A “Would you mind turning your music down, please?”

B “Excuse me, but I can’t read my book with all that noise!”

C “You’re very rude, aren’t you?”

b)

You’re in class. The student behind you is kicking your chair. What do you say?

A “Can you stop that, I can’t concentrate!”

B “Teacher! He’s kicking my chair!”

C “Stop that now!”

c)

It’s the middle of the night. Your neighbour’s dog is barking. You can’t sleep. Do you ...

A phone your neighbour and say “Could you stop Mitzy barking, please?”

B phone the police and say “Would you come quickly, there’s a dangerous animal at Number 22!”

C open the window and shout “Shut up!”

d)

You’re having a romantic dinner in a restaurant. A man near you is shouting on his mobile phone. What do you say?

A “Do you mind moving somewhere else?”

B “Waiter! Please tell this man to go outside!”

C “I’m sorry, but we’re trying to be romantic here!”

Exercise 20. How polite are you? In the following dialogues choose the suitable reply.

a)

Susan

Hi, Mary. How’s life?

Mary

A Fine, thanks. And you?

B Very well, thank you. What about you?

C How do you do?

D Thanks, nice to see you.

b)

Miss Brown

Hello. Could I speak to Ann Jones, please?

Secretary

-
- A** I'm afraid she's away from her desk right now.
B She isn't here.
C She's on another line.
D I don't know where she is.

c)

Teacher
Student

Give me that book. Will you?

-
- A** Very well, then.
B I couldn't say for sure.
C Just a minute.
D Here you are.

d)

Clerk
Customer

I'd like to book two roundtrip tickets to Boston.

-
- A** What do you want?
B May I help you?
C What's the problem?
D Have a nice trip!

e)

Friend
You

OK, see you.

-
- A** Would you excuse me, please? It's time I was going off.
 Good-bye.
B Can I talk to you?
C Well. I must be off now. Bye.
D I'm afraid I must be going now. Good-bye.

f)

Student
Librarian

Could you help me?

-
- A** Wait a minute. Can you come later?
B Oh, I haven't seen you for ages. Would you remind me of
 your last visit here?
C What?
D I'd be glad to. What is it?

g)

Receptionist
Guest

I'd like a single room for one night.

- A** What is your name, please?
B What do you want, sir?
C Good morning, sir. I'm at your service.
D How long are you going to stay at the hotel?

Exercise 21. Complete the following conversations with the phrases from the boxes, say in what situations they are possible, learn them by heart and act them out. Pay attention to the expression in bold and translate them.

a)

I'm sorry	Excuse me	of course	Sorry
------------------	------------------	------------------	--------------

- A** _____ ! Can I get past?
B _____ ?
A Can I get past, please?
B _____. I didn't hear you. Yes, _____.
A Thanks a lot.

b)

That's right	Oh, what a pity	Congratulations	Never mind	I hear
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- A** _____ you are going to get married soon. _____ !
B _____ , next July. July 21. Can you come to the wedding?
A _____ ! That's when we're away on holiday.
B _____. We'll send you some wedding cake.
A That's very kind.

c)

Hurry up	all right	Oh, dear	Just a minute	I haven't a clue
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- A** _____ ! Look at the time! _____ , or we'll miss the train.
B _____ ! I can't find my umbrella. Do you know where it is?
A _____. But you won't need it. It's a lovely day. Just look at the sky!
B Oh, _____. Let's go then.

d)

Good luck	See you later	Same to you	Good idea	What about you
No, of course not				

- A** _____ in your exam!
B _____. I hope we both pass.
A Did you go out last night?
B _____. I went to bed early.?

A Me, too. _____ after the exam. Let's go for a drink.

B _____ .

Exercise 22. Read some proverbs, try to guess their meaning. Give their Russian equivalents.

1. The best things in life are free.
2. A stitch in time saves nine.
3. Still waters run deep.
4. He teaches ill, who teaches all.
5. You can't take it with you when you die.
6. Better untaught than ill taught.
7. Don't cross your bridges before you come to them.
8. Soon learnt, soon forgotten.
9. Even a worm will turn.
10. It was the last straw that broke the camel's back.
11. The way to a man's heart is through his stomach.
12. If the stone falls upon the egg, alas for the egg! If the egg falls upon the stone, alas for the egg!
13. Where there's a will there's a way.
14. Marry in haste, and repent at leisure.
15. One tongue is enough for a woman.
16. If you wish good advice, consult an old man.
17. The best advice is found on the pillow.
18. All clouds bring not rain.
19. You can't tell a book by its cover.
20. Bad news travels fast.
21. No news is good news.
22. Live and let live.
23. Birds of a feather flock together.
24. Tell me who you go with and I'll tell you who you are.

UNIT FOUR

METALWORKING. JOINING

PRONUNCIATION AND VOCABULARY EXERCISES

Exercise 1. Read the following words. Pay attention to the three way of pronouncing the *-(e)s* ending of the a) plural nouns, b) possessive nouns, c) 3rd person singular verbs. Can you give more examples?

a)

- [s] lakes, plates, books, sports, shops, tests, streets
- [z] boys, stores, stones, plans, stars, things, chairs
- [iz] houses, dishes, watches, boxes, classes, buses, pages

b)

- [s] Mike's flat, a student's decision, an accountant's papers
- [z] a girl's doll, an engineer's map, a country's flag, this year's plan, people's will
- [iz] Max's books, Mr Fox's car, Mrs Patch's husband, Ms Jencks' book

c)

- [s] speaks, helps, sits, breaks, costs, eats, writes, fights, keeps, makes, sleeps
- [z] reads, leaves, gives, goes, becomes, says, drives, flies, knows, pays
- [iz] teaches, freezes, kisses, discusses, loses, watches, sneezes

Exercise 2. Read the following words. Pay attention to the three ways of pronouncing the *-ed* ending of the Past Simple and Past Participle. Can you give more Past Simple and Past Participle examples?

- [d] moved, solved, lived, smiled, played, seemed, shaved, closed, answered, opened, considered, joined, enjoyed, carried, occupied, recognized, turned
- [id] translated, visited, waited, elected, consisted, studied, decided, intended, founded, wanted, crowded, surrounded, wounded, landed, included, greeted
- [t] asked, worked, walked, helped, liked, missed, discussed, furnished, passed, reached, picked, published, announced, placed, developed, finished, hushed

Exercise 3. In the following group of words, the nouns end in an unvoiced sound ([s], [f]), and the verbs end in a voiced sound ([z], [v]). Sometimes the spelling changes. Look the words up in the dictionary and

a) give the verb and its phonemic spelling to each of the following nouns.

Advice, half, relief, shelf, excuse

b) give the noun and its phonemic spelling to each of the following verbs.

To use, to abuse, to believe, to grieve

Exercise 4. Look up the word *record* (both as a noun and a verb) in your dictionary. What do you notice about its stress?

The following words have a similar stress pattern – with the stress on the first syllable when the word is a noun and on the second syllable when it is a verb. Read the words accurately first as nouns, then as verbs and translate them.

Conduct, conflict, contest, convert, decrease, desert, export, import, increase, insult, permit, present, progress, protest, reject, subject, suspect, transfer, transport, upset

Exercise 5. Here are some words and expressions that you will come across in the texts of the unit. Study them carefully.

verbs		nouns	
align	совмещать	clutch plate	диск (муфты)
back out	выбивать (напр. болты)	coalescence	сцепления
capture	захватить	conjunction	соединение
couple	соединять; сцеплять	fastener	соединение
mesh	зацеплять(ся); входить в зацепление		крепёжное средство; соединительная деталь
conjunction		flywheel	маховик
whilst	пока	groove	канавка; выемка
adjective and participle		lead	свинец
angular	угольный; угловой	pin	шпилька; штифт
commonplace	обыкновенный; рядовой	ridge	выступ
reliable	надежный; прочный	screw thread	резьба
nouns		slots	канавка; желобок; гнездо
alloy	сплав	spring	пружина
bearing	опора	tin	олово
brass	латунь	torque	момент силы
		wicking	(капиллярное) затекание

READING AND COMPREHENSION EXERCISES

Exercise 1. First read the following text about the metal joints quickly to get the main idea. The words missing from each passage are the names of the joint types. Can you identify the metal joints described?

1. _____s are one of the most common elements in construction and machine design. They consist of fasteners that capture and join other parts, and are secured with the mating of screw threads.

There are two main types of _____ designs. In one method the bolt is tightened to a calculated clamp load, usually by applying a measured torque load. The joint will be designed such that the clamp load is never overcome by the forces acting on the joint (and therefore the joined parts see no relative motion).

The other type of _____ does not have a designed clamp load but relies on the shear strength of the bolt shaft. This may include clevis linkages, joints that can move, and joints that rely on a locking mechanism (like lock washers, thread adhesives, and lock nuts).

2. _____s are ridges or teeth on a drive shaft that mesh with grooves in a mating piece and transfer torque to it, maintaining the angular correspondence between them.

For instance, a gear mounted on a shaft might use a male _____ on the shaft that matches the female _____ on the gear. The _____s on the drive shaft match with the female _____s in the center of the clutch plate, while the smooth tip of the axle is supported in the pilot bearing in the flywheel. An alternative to _____s is a keyway and key, though _____s provide a longer fatigue life.

3. A _____ or _____ is a fastening mechanism consisting of a male side with one or more pins, and a female receptor with matching *L* slots and spring(s) to keep the two parts locked together.

To couple the two parts, the pin(s) on the male are aligned with the slot(s) on the female and the two pushed together. Once the pins reach the bottom of the slot, the two parts are turned in opposite directions to guide the pin across the bottom of the *L* shaped slot. The spring then holds the pin in position to prevent it from backing out. To disconnect, the two parts are pushed together to overcome the spring whilst twisting slightly to reverse the locking turn.

The strength of the joint relies on the shear strength of the pins and the strength of the *L* slots which hold the pins in place when locked. A practiced user can connect them quickly and they are not subject to cross-threading.

Exercise 2. Here are the names of metal joint types missing from the text.

Which passage refers to

bayonet mount spline bolted joints bayonet connector

Exercise 3. Answer the following questions about the text.

1. What are bolted joints?
2. What do bolted joints consist of? What are they secured with?
3. What are the two main types of bolted joint designs?
4. What do we usually apply to tight the bolt to the calculated clamp load?
5. What does the other type of bolted joint rely on?
6. What are splines?
7. Where is the smooth tip of the axle supported?
8. What is a bayonet connector? What does it consist of?
9. How does a bayonet mount connect the two parts?
10. What do you do to disconnect the two parts?

Exercise 4. Complete the sentences with the information from the text.

1. Bolted joints consist of ... that capture and join other parts, and are secured with the mating of
2. There are ... main types of bolted joint designs.
3. In one method the bolt is tightened to ... , usually by applying a measured torque load.
4. The other type of bolted joint does not have a designed clamp load but relies on
5. Splines are ... or ... on a drive shaft that mesh with grooves in a mating piece and transfer ... to it, maintaining ... between them.
6. An alternative to splines is a ... , though splines provide a longer
7. A bayonet mount or bayonet connector is a ... consisting of a male side with one or more ... , and a female receptor with matching ... and ... to keep the two parts locked together.
8. To couple the two parts of ... , the ... on the male are aligned with the ... on the female and the two pushed together.
9. The strength of the joint relies on ... of the pins and ... of the *L* slots which hold the pins in place when locked.

Exercise 5. Re-read the text and determine if the following statements are:

- true
- false
- of no information in the text.

1. Bolted joints are rarely used in construction and machine design.
2. In one design of bolted joints the bolt is tightened to a calculated clamp load, in the other it relies on the shear strength of the bolt shaft.

3. The bolted joint will be designed such that the clamp load is overcome by the forces acting on the joint.
4. Splines are ridges or teeth on a drive shaft that mesh with grooves in a mating piece and transfer torque to it.
5. Drive shafts on vehicles and power take-offs use splines to transmit torque and rotation and allow for changes in length.
6. A bayonet mount is a fastening mechanism consisting of a female side with one or more pins, and a male receptor with matching L slots and spring(s) to keep the two parts locked together.
7. The strength of the joint relies on the shear strength of the pins and the strength of the L slots which hold the pins in place when locked.

Exercise 6. What class of joint do the joints described in the text above belong to? What other types of joints of this kind do you know? Can you list other possible classes of metal joints?

Exercise 7. Read the following text. What class of joint do the joints described in it belong to?

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the workpieces and adding a filler material to form a pool of molten material that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld.

Until the end of the 19th century, the only welding process was forge welding, which blacksmiths had used for centuries to join iron and steel by heating and hammering. Arc welding and oxyfuel welding were among the first processes to develop late in the century, and electric resistance welding followed soon after. Welding technology advanced quickly during the early 20th century as World War I and World War II drove the demand for reliable and inexpensive joining methods. Following the wars, several modern welding techniques were developed, including manual methods like shielded metal arc welding, now one of the most popular welding methods, as well as semi-automatic and automatic processes such as gas metal arc welding, submerged arc welding, flux-cored arc welding and electroslag welding. Developments continued with the invention of laser beam welding, electron beam welding, electromagnetic pulse welding and friction stir welding in the latter half of the century. Today, the science continues to advance. Robot welding is commonplace in industrial settings, and researchers continue to develop new welding methods and gain greater understanding of weld quality and properties.

Soldering is a joining process in which two or more metal items are joined together by melting and flowing a filler metal (solder) into the joint, the filler

metal having a lower melting point than the workpiece. Soldering differs from welding in that soldering does not involve melting the work pieces.

There are three forms of soldering, each requiring progressively higher temperatures and producing an increasingly stronger joint strength: (1) soft soldering, which originally used a tin-lead alloy as the filler metal; (2) silver soldering, which uses an alloy containing silver; (3) brazing which uses a brass alloy for the filler.

In the soldering process, heat is applied to the parts to be joined, causing the solder to melt and to bond to the workpieces in an alloying process called wetting. In stranded wire, the solder is drawn up into the wire by capillary action in a process called wicking. Capillary action also takes place when the workpieces are very close together or touching. The joint strength is dependent on the filler metal used, where soft solder is the weakest and the brass alloy used for brazing is the strongest. Soldering, which uses metal to join metal in a molecular bond has electrical conductivity and is water- and gas-tight. There is evidence that soldering was employed up to 5000 years ago in Mesopotamia.

Exercise 8. Complete each Russian welding word of the puzzle with an appropriate English welding word. If you complete it correctly, the letters circled make another welding word. What is its Russian equivalent?

- | | | | | | |
|----|---|---------|-----|----------------------------|--|
| 1 | сварка с накоплением энергии в магнитном поле | | | | |
| | | | | elect (r) omagnetic | |
| | | | | pulse welding | |
| 2 | сварка трением | _____ | () | _____ | |
| 3 | лазерная сварка | _____ | () | _____ | |
| 4 | сварка трубчатым электродом | _____ - | () | _____ | |
| 5 | газоэлектрическая сварка | _____ | () | _____ | |
| 6 | дуговая сварка с защитой зоны сварки | _____ | () | _____ | |
| 7 | контактная сварка сопротивлением | _____ | () | _____ | |
| 8 | электрошлаковая сварка | _____ | () | _____ | |
| 9 | дуговая сварка под флюсом | _____ | () | _____ | |
| 10 | дуговая сварка | _____ | () | _____ | |
| 11 | кислородно-газовая сварка | _____ | () | _____ | |
| 12 | сварка, сваривание | _____ | () | _____ | |

Exercise 9. Match the terms from the text to their Russian equivalents.

welding	давление
coalescence	припой
melting	смачивание
pressure	сварка
soldering	серебро
brazing	кузнец
forge welding	сплав
blacksmith	плавление
melting point	слияние, срастание
alloy	капиллярность
silver	пайка твердым припоем
brass	латунь
hot glue	пайка (мягким припоем)
wetting	кузнечная сварка
capillary action	температура плавления

Exercise 10. Find in the text the English equivalents for the following Russian words and phrases.

Процесс изготовления; вызывая слияние; добавление наполнителя; сформировать прочное соединение; в сочетании с; само по себе; в отличие от; создать соединение (связь) между; единственный сварочный процесс; нагреванием и ковкой; быстро развивалось; стимулировал спрос на; надежные и недорогие методы соединения; полуавтоматические и автоматические процессы; обычное явление в промышленных условиях; глубже понять; заливая припой в соединение; последовательно требующие все более высоких температур; производящие все более большую крепость соединений; сплав олова и свинца; сплав, содержащий серебро; медный сплав; скорректирован для изменения; части для соединения; в многожильном проводе; прочность соединения; электропроводность; водо- и газонепроницаемый.

Exercise 11. Find in the text the following English words and phrases and give their Russian equivalents.

This is often done by; workpieces; a filler material; with pressure sometimes used; the only welding process; had used for centuries; the first processes to develop; late in the century; followed soon after; following the wars; developments continued with the invention of; in the latter half of the century; weld quality and properties; joined together by; having a lower melting point than; does not involve; originally; heat is applied to the parts to be joined;

in stranded wire; drawn up into the wire; in a molecular bond; there is evidence; up to 5000 years ago.

Exercise 12. Read the following text. What type of joint does the described fastener allow? What joint class does it, in its own turn, belong to? Summarize the text in Russian.

A rivet is a permanent mechanical fastener. Before being installed a rivet consists of a smooth cylindrical shaft with a head on one end. On installation the rivet is placed in a punched or pre-drilled hole, and the tail is upset, or bucked (i.e. deformed), so that it expands to about 1.5 times the original shaft diameter, holding the rivet in place. Because there is effectively a head on each end of an installed rivet, it can support tension loads (loads parallel to the axis of the shaft); however, it is much more capable of supporting shear loads (loads perpendicular to the axis of the shaft). Bolts and screws are better suited for tension applications.

Fastenings used in traditional wooden boat building, like copper nails and clinch bolts, work on the same principle as the rivet but were in use long before the term *rivet* came about and, where they are remembered, are usually classified among the nails and bolts respectively.

Before welding techniques and bolted joints were developed, metal framed buildings and structures such as the Eiffel Tower, Shukhov Tower and the Sydney Harbour Bridge were generally held together by riveting. Riveting is still widely used in applications where light weight and high strength are critical, such as in an aircraft. Many sheet-metal alloys are preferably not welded as deformation and modification of material properties can occur. Common but more exotic uses of rivets are to reinforce jeans and to produce the distinctive sound of a sizzle cymbal.

GRAMMAR EXERCISES

Exercise 1. Make questions from the following statements, asking about the words in italics.

1. *Bolted joints* are one of the most common elements in construction and machine design.
2. One of the bolted joint designs may include *clevis linkages, joints that can move, and joints that rely on a locking mechanism*.
3. Splines are ridges or teeth *on a drive shaft* that mesh with grooves in a mating piece and transfer torque to it.
4. An alternative to splines is *a keyway and key*.

5. A bayonet connector is a fastening mechanism consisting of a male side with pins, and a female receptor with matching *L* slots and springs *to keep the two parts locked together*.
6. Welding is a fabrication process that joins materials, *usually metals or thermoplastics*, by causing coalescence.
7. There are *three* forms of soldering.
8. Soldering was employed *up to 5000 years ago* in Mesopotamia.
9. Soldering was employed up to 5000 years ago *in Mesopotamia*.

Exercise 2. Put in the sentences on the left the appropriate time markers from the list on the right.

_____ I go to the Institute by bus.	before the Institute
I do my morning exercises _____ .	by Tuesday
We shall have invited you _____ .	during October
Who has seen him _____ ?	every day
He had worked here _____ .	just
_____ the plant was producing new machines.	last week
We have _____ done our work.	now
What are you doing _____ ?	recently
He was going home _____ .	usually
Will you have read the book _____ ?	when we met
Did you see them _____ ?	when he comes home
We translated this text _____ .	

Exercise 3. Read the confusing words in the boxes attentively and insert the suitable one in the necessary form in the sentences that follow. Translate the sentences.

a)

ago (тому назад)	before (до того)
-------------------------	-------------------------

Sandra left school 6 months _____. She washed her hair _____ she went to the party.

b)

affect (гл. влиять)	effect (сущ. эффект)
----------------------------	-----------------------------

The closing down of the factory _____ many families in. The _____ of pollution can be seen all over the world.

c)

after (предл. после)	afterwards (нареч. позже)
-----------------------------	----------------------------------

He called _____ I had finished work. They went to the cinema and _____ they went home.

d)

all ready (все готовы)	already (уже)
-------------------------------	----------------------

The children are _____ to go. By the time I got there, the train had _____ left.

e)

any way (любой способ)	anyway (тем не менее)
-------------------------------	------------------------------

They couldn't find _____ to get out of the building. The coat was expensive, but I bought it _____.

f)

at the beginning (в начале)	at the end (в конце)
in the beginning (сначала)	in the end (наконец)

There's a contents page _____ of the book. He thought German was hard _____ but now he finds it easy. We're going to Japan _____ of July. He tried various jobs and _____ became an accountant.

g)

beside (возле)	besides (помимо)
-----------------------	-------------------------

The sofa is _____ the fireplace in my house. _____ buying us dinner last night, he paid for the theater tickets.

h)

besides (нареч. к тому же)	except (срединый предл. кроме)
but (ненадальный союз кроме)	except for (предл. кроме)
apart from (предл. помимо)	

_____, it's going to rain. Everyone in the company got a pay rise _____ James. I cleaned every room _____ the kitchen. _____ the security guard, the building was empty. _____ washing the car, what else have you done today?

Exercise 4. Open the brackets using the verbs in one of the following tenses: Present, Past or Future Simple; Present, Past Continuous; Present, Past Perfect.

1. Yesterday Nick (to say) _____ that he (to read) _____ much during his summer vacation.
2. At the age of twenty my father (to combine) _____ work and study.
3. A great number of students (to study) _____ in the reading-room when I (to enter) _____ it last night.
4. The storm (to rage) _____ the whole night, and the sailors (to try) _____ to do their best to save the ship.
5. Mike's friends could hardly recognize him as he (to change) _____ greatly after his expedition to the Antarctic.
6. When I (to enter) _____ the hall, the students (to listen) _____ to a very interesting lecture in history.
7. Hello! Where you (to go) _____? – Nowhere in particular. I just (to take) _____ a walk.
8. Our students (to do) _____ all kinds of exercises and now they (to be) _____ sure that they (to know) _____ this rule well. They (to hope) _____ they (to make) _____ no mistakes in the test-paper.
9. The expedition (to cover) _____ hundreds of kilometers, but they still (to be) _____ far from their destination.
10. You (to go) _____ to Great Britain next year?

Exercise 5. Answer the questions as suggested in the pattern below.

- A** When does the train start?
B The train starts at 11.45.
A What did I ask **B**?
C You asked him when the train started.
A What did **B** answer?
D He answered that the train started at 11.45.

1. Is English more difficult than German?
2. Where did you have lunch yesterday?
3. When will it be convenient for you to have a word with a President?
4. What can you recommend us to do to know English better?
5. Do all students remember all they words of Unit 1?
6. What dish does your mother like best of all?
7. Is it necessary for you to learn English?
8. Do you know enough words to speak English well?

Exercise 6. Translate the following sentences into Russian.

1. I study at the machine-building department, my specialty being technology of machine design.
2. The solution is considered to be engineering if it satisfies the requirements of efficiency, reliability and simplicity in the cheapest way possible.
3. The Delegation is reported to have left London.
4. We had his name mentioned.
5. The men building our house with me are my friends.
6. Metalworking is the process of working with metals to create individual parts, assemblies, or large scale structures.
7. He is sure to be asked about it.
8. They have used the conventional crystal growth method.
9. It's easy for me to answer this question.
10. I saw John passing our house.
11. I have my photo taken.
12. She is expected to come any minute.
13. They have used the temperature control system.
14. There was nothing else for me to say.
15. The approach is used for time and money saving purposes.
16. He was glad to have been given a new job.
17. The house being built in our street is a new building of school.
18. Having been built of concrete, the house was cold in winter.
19. Lost time is never found again.
20. He wants the book to be returned tomorrow.
21. They have constructed a gas-filled high pressure cell.
22. Machining is supposed to deal with the using of complex equipment known as cutting instruments, all kinds of devices, fixtures and adapters.
23. He is likely to know her address.
24. The research team developed a new kind of information receiving system.
25. The logic device produces a specific type signal for specific sensor state.
26. The amount of polonium to be obtained from a uranium mineral can be simply calculated.
27. We may suppose the alpha particles within the nucleus to be in motion.
28. This substance is reported to possess the property of radioactivity.
29. The speed of light being extremely great, we cannot measure it by ordinary means.
30. Automation of all industrial processes being of great importance now, the number of automatic plants is growing in our country.
31. They will have to separate iron from sulphur with magnet.
32. The pipes to convey fluids are usually made of steel.
33. Galileo was the first to observe sun spots with his optic tube in 1609.
34. To translate ancient manuscripts was a very difficult task.

35. He was glad to have fulfilled his work ahead of time.
36. The isolation of radium followed by many important investigations made on other previously unknown elements proved to be of great importance.
37. Water being denser than air, rays is refracted towards the perpendicular.
38. Einstein computed the amount of scattering to be expected on the basis of the formula given above.
39. He was the first to determine the exact weight proportions of water components.
40. To develop machine-building industry engineers have to work out new types of production.
41. Other conditions being equal, the temperature remains the same.
42. The gas to be tested is enclosed in a long glass tube.
43. Once formed, bubbles rise because of the vapour being less dense than the liquid in which it is suspended.
44. Simple substances consist of atoms, each substance having its own special kind of atom.
45. More accurate experiments are likely to contribute significant information.
46. We have thought this law to hold only for gases that are under normal conditions.
47. They expected the acceleration to be different weights but this was not the case.
48. The light from a star is known to have been coming to us for many years.
49. The term "pure metal" is used to describe a material from which all chemical elements but one has been eliminated.
50. A new technique having been worked out, the income rose.

SPEECH AND WRITING EXERCISES

JOB. CVS, FORMAL LETTERS, ENVELOPES

Exercise 1. A CV (*curriculum vitae*, Latin; a résumé in American English) is a piece of paper written by someone who is applying for a job, giving basic information about his / her life.

Here is an example of a CV, written in the style used in the UK. Answer these questions: What kind of position do you think this person would be suitable for? Whose CV do you think it is?

Name:	???
Date of birth:	14th November 1948
Nationality:	British
Marital status:	Married for the second time. Two sons by the first wife.

Professional experience:	1976 – Voluntary charity work 1971-76 – Royal Navy
Education:	1970 Graduated in archeology, anthropology and history (Cantab) 1966 Geelong Grammar School, Australia 1961-1966 Gordonstoun School, Scotland
Languages spoken:	English, French, Welsh
Publications:	<i>The Old Man of Lochnagar</i> (a children's story) <i>A Vision of Britain</i> (an essay on architecture)
Leisure activities:	Polo, sketching, fox hunting, gardening, travelling

Some of the headings used in the example CV would need to be used by any candidate applying for any job, and some are appropriate only for some people and /or some jobs. Which headings are appropriate in all circumstances and which only in some situations? Can you think of any other headings which might be useful in a CV? Is it better for a CV to be long or short?

Exercise 2. Read the CV writing tips which will help you clarify your experience, achievements, skills, education, and other background information.

CV Writing Tips

Step One: Focus. Decide what type of job you are applying for and then write it. You should name the position you want.

Step Two: Education. List any education or training you have got. If you are a recent college or university graduate and have little experience, then your education section should be placed at the top of your CV. Show your secondary school education and activities on a CV if you are under 20 and have no education or training beyond secondary school. Continuing education shows that you care about life-long learning and self-development, so think about any relevant training since your formal education was completed.

Step Three: Your Jobs. Starting with your present position, list the title of every job you have held along with the name of the company, the city / town, and the years you worked there.

Step Four: Job Descriptions. Under each job, make a list of your duties. Never use personal pronouns (I, my, me). Instead of saying, "I planned, organised, and directed..." you should say, "Planned, organised, and directed...". It is important

to use nouns or short phrases that describe your experience and education like: C++, UNIX, network, project management, etc, well-known company names and universities.

Step Five: Relevant Qualifications. At the bottom of your CV, think about anything else that might qualify you for your job objective. This includes licenses, certificates, and sometimes even interests and hobbies if they are truly relevant. For instance, stating in your CV that you play tennis or are a gymnast would be appropriate if you want a job in sports marketing.

Step Six: Profile. Last but not least, write four or five sentences that give an overview of your qualifications. This profile, or qualifications summary, should be placed at the beginning of your CV. You can include some of your personal qualities or special skills. Here is a sample profile section for a computer systems technician:

- Experienced systems / network technician with significant communications and technical control experience;
- Focused and hard working;
- Effective team player with outstanding communication and interpersonal skills.

Exercise 3. Look at another CV. Match the tips of CV writing from Exercise 2 to the elements of the CV below.

Name: Jennifer Dewer
Address: 1624 Oak Lane – St.Louis,
 Missouri
Telephone: 63031314-5222212
E-mail address: Jennifer_Dewer@firstchoice.com

Educator Driver and Traffic Safety

- Patient and caring professional committed to helping students learn.
- Certified in driver and traffic safety from Midwest State University.
- Memberships include ADTSEA (American Driver / Traffic Safety Education Association), MDTSEF (Midwest Driver / Traffic Safety Education Association), and the National Association of Female Executives.
- Additional background as a Missouri Licensed Property Casualty Insurance Agent for Home, Auto, Health, and Life.

Professional experience: First Choice Insurance Company, St. Louis, Missouri
 Insurance Agent, April 1992 – July 2002

- Managed insurance agency daily operations, including territories and accounts;
- Hired, trained and motivated support Personnel;
- Assessed client needs and established long-term client relationships.

S&D Railroad Company, St. Louis, Missouri
Conductor, March 1981 – November 1989

- Responsible for movement of foreign traffic between pre-determined destinations.

Frontenac School District, Frontenac, Missouri Transportation Department, Building and Grounds, and Substitute Teacher, October 1974 – March 1981

- Employed during entire college experience 20-40 hours per week.

Education:

Midwest State University, St. Louis, Missouri
Driver / Traffic Safety Education Certification, August, 2004;

Renewal of Missouri Educators License July, 2004;

Missouri Educators College, St. Louis, Missouri

Graduate Level Coursework in Education, 1991-1992;

Bachelor of Art Degree in Elementary Education, 1978;

Semester Honors, Semester Highest Honors, 1978;

Awarded compensated internship (for teaching).

Exercise 4. Write your own CV, following the tips given in Exercise 2 and the CV examples in Exercises 1 and 3.

Exercise 5. Here is a letter of application for a job. Read it carefully paying attention to the conventions of the formal letter style: How do you begin the letter? How do you end the letter? Where do you put your name? Are there any contractions? What have you noticed about the punctuation?

3333 Imperial Way
K-10004 Freetown
Brighton

European Holiday Office
 ACME Atlantic Ltd
 45 Pentonville Road
 London EC2 4AC

13 May 20__

Dear Sir or Madam,

I am writing to apply for the *post / job* of Social Events Organizer which was advertised in last week's edition of Summer Jobs.

I am *now / currently* studying French and Italian at London University, so I speak both languages well.

I feel I would be *suitable / right* for this position because I have good organizational skills, and I greatly enjoy going out and meeting new people. I have lived in London all my life so I know many of the places that young students would enjoy.

I have experience of this kind of work. Last summer I *was employed by / worked for* Imperial Hotels as a Tour Organizer, and I arranged excursions to places of interest in and around London. I also worked for London Life last Christmas, which involved taking *groups of / some* American tourists around the capital.

My course finishes in the middle of June, so I *would be available for work / can start working* at any time during July and August.

Please do not hesitate to contact me if you *need / require* any *further / more* information. I look forward to hearing from you.

Yours faithfully,

/signature/

Jean Muster

Exercise 6. Write a letter of application for a job: You see the following advertisement and decide to apply.

We are looking for Summer Camp Hosts to help teach and entertain children aged 10-12 at our Summer Camp in August.

If you are good with children, keen on sports and other outdoor activities, and have a lively and outgoing personality, then we'd like to hear from you. We offer good rates of pay and free accommodation.

**Reply to
 Sumer Camp Travel,**

**18, Kings Rd
Birmingham**

Follow these instructions when you write your letter of application.

1. Write in a formal style. Avoid informal language.
2. Cover the three qualities they ask for (good with children, sports, personality), explaining clearly why you think you have these qualities. Use your imagination here. Don't be afraid to exaggerate a little.
3. Use some of the phrases from the letter in Exercise 5.
4. Be sure to tell them something about your present situation and when you could begin working.
5. Arrange your letter in clear paragraphs.
6. Don't write more than 180 words.

Exercise 7. Besides the letter of application for a job, there exist several other types of formal letter. Look at the following extracts from the letters and match them with the types of the formal letter in the box (there are some extra ones).

cover letter	letter of thanks	memo (memorandum)	letter of complaint
letter of invitation	letter of refusing an invitation		offer letter
letter of apology	letter of sympathy	letter of congratulation	
letter of asking for information		letter of application for a grant	

a) Under the circumstances, I feel justified in asking for a refund. I would therefore be grateful if you could refund me the extra £ 14 I had to spend on the tickets and the £ 10 charge for parking. I am enclosing the receipts for these.

I look forward to hearing from you.

Yours faithfully,

D D Jones

b) I am interested in renting the farmhouse for the last two weeks of July for myself, my wife and two children aged 7 and 9. Could you let me know whether it would be free then, how much it would cost and what the price includes?

c) From Monday 8 May English classes will be held in the Training Centre (room 3.17). There will be two groups: intermediate level (8.30 – 10.00) and advanced level (10.30 – 12.00). please encourage your staff to attend one of the sessions. All teaching materials will be provided but students will be expected to do homework and preparations outside working hours.

d) The most suitable of our products for your requirement is the Artemis 66A Plus. This product combines economy, quick charging time and is now in stock. I enclose a detailed quotation, specifications and delivery terms.

e) Dear Ms Prior,

Thank you for coming for interview on April 13. We have considered your application carefully, but regret that we are unable to offer you the post.

f) Dear Mr Reynard,

As you know, we have bought several machines from your company and been quite satisfied with their performance. We have even recommended Fox machines to other companies. Recently, however, the standard of your after-sales service has gone much worse.

g) Secondly, I have a number of queries regarding your daily timetable of fitness classes. Does it include other kinds of fitness classes besides aerobics, aqua aerobics, yoga and kick boxing?

And finally, I would like to know more details about prices. I would be grateful if you could send me a booklet or if you could contact me at (777) 777-7777. I look forward to hearing from you.

h) Thank you for all the help you have given me with my job search.

I especially appreciate the information and advice you have provided, and the contacts you have shared with me. Your assistance has been invaluable to me during this process.

i) Dear Mr Rook,

It was with great pleasure that I heard of your promotion to District Sales Manager. You are inheriting a great team, and I am sure that your ability to motivate will make them even more effective.

Congratulations, and good luck in your new position.

j) It was not my intention to cause any damage or inconvenience. In retrospect, I believe the situation resulted from mere misunderstanding. While this is by no means an excuse for what happened, knowing the cause will help me guard against future mistakes.

k) I am really sorry to hear about what happened. I know how hard you worked and how much the position meant to you. But I know you will pick yourself up and find a job in no time!

l) I heard that you just closed on the Mansion on Fifth Street that has been on the market for three years. Well done!

I know you spent a lot of time with the sellers, working with them to make the property more appealing. Your patience and persistence has finally paid off. I am so happy for you!

m) Welcome to The Ohio State University. We are thrilled that you have joined one of the best universities in the country! As a new member of the Buckeye community you are now part of an outstanding institution rich in tradition and values. You are poised for a bright and exciting future.

n) I am pleased to offer you the position of Chief Engineer at the London Port. The offered position is full-time beginning on the 1st of May this year, at a salary of £ 30,000. You will be paid monthly.

o) The Executive Board and I would like to invite you to attend our Spring 2013 induction of this past year's academically outstanding students. We are proud of our chapter's successes and efforts to recognize and promote academic excellence at Fresno State. Our induction has become a major forum on campus for the recognition of academic achievement.

Exercise 8. Study the formal letter writing conventions once again and put the following parts of the formal letter in the correct order. Which type of formal letter do you think it belongs to?

- ☐ Yours truly
- ☐ City College
- 14 Mountain View, WA 9999
- ☐ Would you please send me a copy of World Wide Dictionary, unabridged second edition, 1982? I am inclosing a money order for \$37.50 to cover cost and handling. If this amount is nor correct, please let me know.
- ☐ Dear Ms Smith,
- ☐ September 15, 1997
- ☐ Miss R.J. Smith
- ☐ Blackstone Book Agency
- Sixth and Riverside Avenue
- Olympia, WA 9999
- ☐ Josephina Black
- Principal

Exercise 9. Here is an envelope. Study it carefully and match the information under numbers with its meaning.

<p>(1) Jackson Brothers 2520 Visita Avenue (2) Olympia, WA 28561 (3) USA</p>	<p>John Wilson (4) 4 New High Street (5) Oxford, OX37AQ (6) England</p>
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- | | |
|--|------------------------------------|
| | the country the letter comes from |
| | the addressee's house number |
| | the sender |
| | the country in the mailing address |
| | the town in the mailing address |
| | the town the letter comes from |

TEXTS FOR TRANSLATION PRACTICE

Current emphases in automation

Currently, for manufacturing companies, the purpose of automation has shifted from increasing productivity and reducing costs, to broader issues, such as increasing quality and flexibility in the manufacturing process.

The old focus on using automation simply to increase productivity and reduce costs was seen to be short-sighted, because it is also necessary to provide a skilled workforce who can make repairs and manage the machinery. Moreover, the initial costs of automation were high and often could not be recovered by the time entirely new manufacturing processes replaced the old. (Japan's "robot junkyards" were once world famous in the manufacturing industry.)

Automation is now often applied primarily to increase quality in the manufacturing process, where automation can increase quality substantially. For example, automobile and truck pistons used to be installed into engines manually. Hazardous operations, such as oil refining, the manufacturing of industrial chemicals, and all forms of metal working, were always early contenders for automation.

Another major shift in automation is the increased emphasis on flexibility and convertibility in the manufacturing process. Manufacturers are increasingly demanding the ability to easily switch from manufacturing Product A to manufacturing Product B without having to completely rebuild the production lines. (1180 printed characters)

Numerical control

Numerical control or numerically controlled (NC) machine tools are machines that are automatically operated by commands that are received by their processing units. NC machines were first developed soon after World War II and made it possible for large quantities of the desired components to be very precisely and efficiently produced (machined) in a reliable repetitive manner. These early machines were often fed instructions which were punched onto paper tape or punch cards. In the 1960s, NC machines largely gave way to CNC, or computer numerical control, machines. (GE had its NC 550 workhorse for many years until they came out with their first CNC (model 1050) in August 1974.)

Numerical Control (NC) was the precursor of today's Computer Numerical Control (CNC), which controls the automation of machine tools and the inherent tool processes for which they are designed. The CNC machine tool is the servo actuator of the CAD/CAM (Computer Assisted Design/Computer Assisted Manufacturing) technology both literally and figuratively. CNC inherits from NC the essential character of by-the-numbers interpolation of transition points in

the work envelope of a multi-axis motion platform, based on the separation of programming from operations. (1000 pr. ch.)

On-off control

For example, a thermostat is a simple negative-feedback control: when the temperature (the “measured variable” or MV) goes below a set point (SP), the heater is switched on. Another example could be a pressure-switch on an air compressor: when the pressure (MV) drops below the threshold (SP), the pump is powered. Refrigerators and vacuum pumps contain similar mechanisms operating in reverse, but still providing negative feedback to correct errors.

Simple **on-off** feedback control systems like these are cheap and effective. In some cases, like the simple compressor example, they may represent a good design choice.

In most applications of on-off feedback control, some consideration needs to be given to other costs, such as wear and tear of control valves and maybe other start-up costs when power is reapplied each time the MV drops. Therefore, practical on-off control systems are designed to include hysteresis, usually in the form of a deadband, a region around the setpoint value in which no control action occurs. The width of deadband may be adjustable or programmable. (920 pr. ch.)

Proportional control

When controlling the temperature of an industrial furnace, it is usually better to control the opening of the fuel valve **in proportion to** the current needs of the furnace. This helps avoid thermal shocks and applies heat more effectively.

Proportional negative-feedback systems are based on the difference between the required set point (SP) and measured value (MV) of the controlled variable. This difference is called the *error*. Power is applied in direct proportion to the current measured error, in the correct sense so as to tend to reduce the error (and so avoid positive feedback). The amount of corrective action that is applied for a given error is set by the gain or sensitivity of the control system.

At low gains, only a small corrective action is applied when errors are detected: the system may be safe and stable, but may be sluggish in response to changing conditions; errors will remain uncorrected for relatively long periods of time: it is over-damped. If the proportional gain is increased, such systems become more responsive and errors are dealt with more quickly. There is an optimal value for the gain setting when the overall system is said to be critically damped. Increases in loop gain beyond this point will lead to oscillations in the MV; such a system is under-damped. (1100 pr. ch.)

English system of manufacturing

The English system of manufacturing was an early system of industrial production that required skilled machinists who were required to produce parts from a design or model. But however skilled the machinist, parts were never absolutely identical, and each part had to be manufactured separately to fit its counterpart. This was almost always done by one person who produced the completed item from start to finish.

The growth of the use of Interchangeable parts and mass production led to the system disappearing from mainstream industry. Mass production using interchangeable parts was first achieved in 1803 by Marc Isambard Brunel in cooperation with Henry Maudslay, and Simon Goodrich, under the management of (with contributions by) Brigadier-General Sir Samuel Bentham the Inspector General of Naval Works at Portsmouth Block Mills at Portsmouth Dockyard for the British Royal Navy during the Napoleonic War. By 1808 annual production had reached 130,000 sailing blocks. This method of working did not catch on in general manufacturing in Britain for many decades, and when it did it was imported from America, and became known as the American system of manufacturing, even though it originated in England. (1000 pr. ch.)

Vertu

Vertu is a British-based manufacturer and retailer of luxury mobile phones. Formerly a wholly owned subsidiary, the business is now an independently run division of the Finnish mobile-phone manufacturer Nokia. Each phone is made up of hundreds of components made from stainless steel, ceramics, carbon fiber, finest grade leather (some with alligator skin). The screens of all handsets are made of ultra-thin sapphire crystal that takes fifteen days to create. Precious pieces may include 18k yellow, white, or rose gold, or platinum, along with diamonds. Every key is individually ground and cut from sapphire. All leather is sourced from Northern Europe. The high fidelity sound system sets a new benchmark for audio performance on a mobile phone. Demonstrating its acoustic clarity, the London Symphony Orchestra (which produces all Vertu ringtones) performed a piece composed by Dario Marianelli exclusively for Vertu. (780 pr. ch.)

American system of manufacturing

The American System involved semi-skilled labor using machine tools and jigs to make standardized, identical, interchangeable parts, manufactured to a tolerance, which could be assembled with a minimum of time and skill, requiring little to no fitting. The system is also known as **armory practice** because of the history of its development by the United States Department of War in the Springfield and Harpers Ferry armories^[1] (and their inside and outside gun-making contractors). The name “American system” came not from any aspect of the system that is unique to the American national character, but

simply from the fact that for a time in the 19th century it was strongly associated with the American companies who first successfully implemented it, and how their methods contrasted (at that time) with those of British and continental European companies. Within a few decades, manufacturing technology had evolved further, and the ideas behind the “American” system were in use worldwide.

Interchangeability of parts was finally achieved by combining a number of innovations and improvements in machining operations and machine tools, which were developed primarily for making textile machinery. These innovations included the invention of new machine tools and jigs (in both cases, for guiding the cutting tool), fixtures for holding the work in the proper position, and blocks and gauges to check the accuracy of the finished parts. (1250 pr. ch.)

Making interchangeable metal parts

A critical factor in making interchangeable metal parts was the invention of several machine tools, such as the slide rest lathe, screw cutting lathe, turret lathe, milling machine and metal planer. One of the most important and versatile of these machine tools was David Wilkinson's lathe, for which he received a \$10,000 award from the government of the United States. Eli Whitney is generally credited with the idea and the practical application, but both are incorrect attributions. Based on his reputation as the inventor of the cotton gin, the US government gave him a contract in 1798 for 10,000 muskets to be produced within two years. It actually took eight years to deliver the order, as Whitney perfected and developed new techniques and machines. In a letter to Treasury Secretary Oliver Wolcott apologizing for the delays,

Whitney did use machinery; however, there is no evidence that Whitney produced any new type of metal working machinery. After completing the initial contract, Whitney went on to produce another 15,000 muskets within the following two years. Whitney never actually expressed any interest in interchangeability until 1800, when he was exposed to the memoirs of Blanc by Treasury Secretary Wolcott, but he spent far more time and energy promoting the idea than developing it. (1100 pr. ch.)

The history of manufacturing engineering (1)

The history of manufacturing engineering can be traced to factories in the mid 19th century USA and 18th century UK. Although large home production sites and workshops were established in ancient China, ancient Rome and the Middle East, the Venice Arsenal provides one of the first examples of a factory in the modern sense of the word. Founded in 1104 in the Republic of Venice several hundred years before the Industrial Revolution, this factory mass-produced ships on assembly lines using manufactured parts. The Venice Arsenal apparently produced nearly one ship every day and, at its height, employed 16,000 people.

Many historians regard Matthew Boulton's Soho Manufactory (established in 1761 in Birmingham) as the first modern factory. Similar claims can be made for John Lombe's silk mill in Derby (1721), or Richard Arkwright's Cromford Mill (1771). The Cromford Mill was purpose-built to accommodate the equipment it held and to take the material through the various manufacturing processes. One historian, Murno Gladst, contends that the first factory was in Potosí. The Potosi factory took advantage of the abundant silver that was mined nearby and processed silver ingot slugs into coins. (1000 pr. ch.)

The history of manufacturing engineering (2)

British colonies in the 19th century built factories simply as buildings where a large number of workers gathered to perform hand labor, usually in textile production. This proved more efficient for the administration and distribution of materials to individual workers than earlier methods of manufacturing, such as cottage industries or the putting-out system.

Cotton mills used inventions such as the steam engine and the power loom to pioneer the industrial factories of the 19th century, where precision machine tools and replaceable parts allowed greater efficiency and less waste. This experience formed the basis for the later studies of manufacturing engineering. Between 1820 and 1850, non-mechanized factories supplanted traditional artisan shops as the predominant form of manufacturing institution.

Henry Ford further revolutionized the factory concept and thus manufacturing engineering in the early 20th century with the innovation of mass production. Highly specialized workers situated alongside a series of rolling ramps would build up a product such as (in Ford's case) an automobile. This concept dramatically decreased production costs for virtually all manufactured goods and brought about the age of consumerism. (1000 pr. ch.)

Professional engineer

In some countries, "professional engineer" is the term for registered or licensed engineers who are permitted to offer their professional services directly to the public. Professional Engineer, abbreviated (PE – USA) or (PEng – Canada), is the designation for licensure in North America. In order to qualify for this license, a candidate needs a bachelor's degree from an ABET recognized university in the USA, a passing score on a state examination, and four years of work experience usually gained via a structured internship. In the USA, more recent graduates have the option of dividing this licensure process into two segments. The Fundamentals of Engineering (FE) exam is often taken immediately after graduation and the Principles and Practice of Engineering exam is taken after four years of working in a chosen engineering field. (700 pr. ch.)

Modern tools

Many manufacturing companies, especially those in industrialized nations, have begun to incorporate computer-aided engineering (CAE) programs into their existing design and analysis processes, including 2D and 3D solid modeling computer-aided design (CAD). This method has many benefits, including easier and more exhaustive visualization of products, the ability to create virtual assemblies of parts, and ease of use in designing mating interfaces and tolerances.

Other CAE programs commonly used by product manufacturers include product life cycle management (PLM) tools and analysis tools used to perform complex simulations. Analysis tools may be used to predict product response to expected loads, including fatigue life and manufacturability. These tools include finite element analysis (FEA), computational fluid dynamics (CFD), and computer-aided manufacturing (CAM). (750 pr. ch.)

Flexible manufacturing system

A flexible manufacturing system (FMS) is a manufacturing system in which there is some amount of flexibility that allows the system to react to changes, whether predicted or unpredicted. This flexibility is generally considered to fall into two categories, both of which have numerous subcategories. The first category, machine flexibility, covers the system's ability to be changed to produce new product types and the ability to change the order of operations executed on a part. The second category, called routing flexibility, consists of the ability to use multiple machines to perform the same operation on a part, as well as the system's ability to absorb large-scale changes, such as in volume, capacity, or capability. Most FMS systems comprise three main systems. The work machines, which are often automated CNC machines, are connected by a material handling system to optimize parts flow, and to a central control computer, which controls material movements and machine flow. The main advantages of an FMS is its high flexibility in managing manufacturing resources like time and effort in order to manufacture a new product. The best application of an FMS is found in the production of small sets of products from a mass production. (1000 pr. ch.)

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