ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ ОБРАЗОВАТЕЛЬНОЕ
УЧРЕЖДЕНИЕ ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ
«ЮЖНЫЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»

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OUTSTANDING INVENTIONS AND DISCOVERIES

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Учебное пособие на модульной основе «Outstanding Inventions and Discoveries» предназначено для практических занятий по развитию и совершенствованию навыков чтения и говорения на основе прочитанного материала. Учебное пособие построено на аутентичных материалах, посвященных выдающимся достижениям и открытиям, которые внесли наиболее значительный вклад в развитие науки и повлияли на повседневную жизнь людей. Каждый модуль включает текст для аудиторного чтения, набор лексико-грамматических упражнений, задания, направленные на развитие навыков говорения, а также творческие задания.

Данное учебное пособие предназначено для студентов 1 курса, изучающих информационные и компьютерные технологии и может быть рекомендовано как для аудиторной, так и для самостоятельной работы.

Методическая записка

Данное учебное пособие на модульной основе предназначено для аудиторной работы студентов 1 курса по теме «Outstanding inventions and discoveries».

Учебное состоит из 6 модулей, посвященных выдающимся достижениям и открытиям, которые внесли наиболее значительный вклад в развитие науки и оказали большое влияние на развитие человечества. Основной целью учебного пособия является развитие и совершенствование навыков чтения и говорения на основе прочитанного материала.

Учебное пособие построено на аутентичных материалах, основными источниками которых являются Интернет, британские и американские научно-популярные издания.

Каждый модуль учебного пособия включает следующие рубрики:

«Before you start» способствует повышению интереса и мотивации студентов к изучаемому материалу.

«Reading» включает текст, содержащий историю развития изобретения с рядом заданий, ориентированных на развитие навыков различных видов чтения.

«Vocabulary» содержит задания, направленные как на закрепление активной лексики модуля, так и на расширение словарного запаса по теме.

«Grammar» акцентирует внимание студентов на сложных грамматических явлениях и предлагает задания, позволяющие устранить трудности, возникающие при чтении и переводе текстов.

«Speaking» предлагает задания, направленные на обобщение прочитанного материала в форме его краткого изложения и формирование умения прокомментировать прочитанные тексты.

«Project work» позволяет студентам применять навыки работы с мультимедийными средствами для изучения английского языка и развивать навыки работы в коллективе. Успешное выполнение заданий раздела способствует совершенствованию навыков публичной речи и умения твердо

и четко аргументировать свою позицию, приводя доводы в свою пользу, что способствует повышению уверенности и самооценки личности.

«Points for reflection» способствует рефлексии прочитанного и формированию личностного отношения к предложенному материалу. Студентам предлагается выполнить задание рубрики в письменном виде и внести его результаты в «Языковой портфель».

Progress test осуществляет рубежный контроль знаний материала и мониторинг академических навыков.

Модули включают рекомендации для эффективного выполнения заданий и тренировки академических навыков.

Для осуществления самооценки предполагается использование рейтинговой системы контроля знаний. Каждый модуль включает таблицу итогового контроля, который предполагает полное и правильное выполнение основных заданий, предлагаемых в модуле. Выполнение заданий расчитывается в баллах и оценивается по следующей шкале:

- оценка «5» 100-90%
- оценка «4» 89-65%
- оценка «3» 64-50%
- оценка «2» 49% и менее

Модуль 6 учебного пособия является итоговым и содержит ряд игровых и творческих заданий, способствующих закреплению полученных знаний и повышению интереса к изучаемому материалу. В модуль информационно-аналитические сборник Hotlist «Inventions and Discoveries that Shaped the World», посвященные ученным и изобретателям в области информационных и компьютерных технологий, физики, радиотехники, системного анализа и математики. Сборник Hotlist имеет своей целью обеспечение широкого спектра дополнительного аутентичного материала по теме, что обеспечивает возможность личного выбора тематики, индивидуальный график подготовки, а также способствует развитию аналитических и поисково-исследовательских навыков студентов.

Выполнение заданий итогового модуля является дополнительным и может проводиться преподавателем в форме тестового контроля изученного материала. В модуль также включены дополнительные творческие задания. Каждый студент может, по желанию, самостоятельно выполнить некоторые задания модуля, представив их результаты в виде приложения к профессионально-языковому портфелю.

Учебное пособие также содержит ключи к наиболее сложным лексическим и грамматическим упражнениям, что позволяет использовать данные материалы для самостоятельной работы студентов, и список общенаучной и терминологической лексики по модулям, рекомендуемой для расширения словарного запаса по теме.

Учебное пособие может использоваться в работе со студентами с различным уровнем знания английского языка, как для групповой, так и для индивидуальной работы.

Module 1

Bar Code Reader

Objectives of the module:

- to develop reading for details skills
- to refresh Present Passive
- to increase vocabulary on the topic “Electronic payments”
- to learn how to sum up the information using mind maps

Before you start

1 You are going to read about an input device barcode reader/scanner. Before you read the text answer the following questions.

a) What is bar code?

b) What types of information do barcodes represent?

c) Do we use this device in everyday life?

d) Have any modern inventions or discoveries replaced them?

e) What are the advantages of using barcode scanner at a supermarket?

Reading

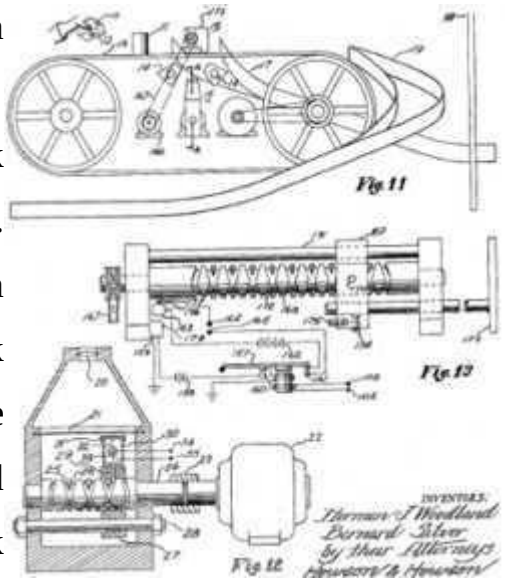
1 Pay attention to the correct pronunciation of the following words.

merchandise	[ˈmɜːʃtəndaɪs]	width	[widϴ]
automatically	[ˌɔːtəˈmætɪklɪ]	employee	[ɪmˈpl ɔɪiː]
glow	[gləʊ]	designate	[ˈdezɪgneɪt]
ultraviolet	[ˌʌltrəˈvaɪələt]	identification	[ˌaɪdentɪfɪˈkeɪʃn]
earnings	[ˈɜːnɪŋz]	inventory	[ˈɪnvetri]
quit	[qwit]		

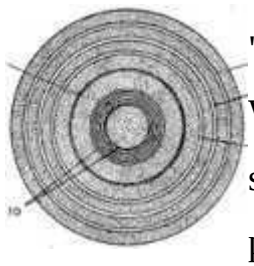
2 Read the text and think of the proper title for it. Explain your choice.

In 1932 an ambitious project was conducted by a small group of students headed by Wallace Flint at the Harvard University Graduate School of Business Administration. The project proposed that customers select desired merchandise from a catalog by removing corresponding punched cards from the catalog. These punched cards were then handed to a checker who placed the cards into a reader. The system then pulled the merchandise automatically from the storeroom and delivered it to the checkout counter. A complete customer bill was produced and inventory records were updated. (1)

Modern bar code began in 1948. Bernard Silver, a graduate student at Drexel Institute of Technology in Philadelphia, overheard the president of a local food chain asking one of the deans to undertake research to develop a system to automatically read product information during checkout. Silver told his friend Norman Joseph Woodland about the food chain president's request. Woodland was a twenty seven year old graduate student and a teacher at Drexel. The problem fascinated Woodland and he began to work on the problem. (2)



Woodland's first idea used patterns of ink that would glow under ultraviolet light. Woodland and Silver built a device which worked, but the system had problems with ink instability and it was expensive to print the patterns. Woodland was still convinced they had a workable idea. Woodland took some stock market earnings, quit his teaching job at Drexel, and moved to his grandfather's Florida apartment to have more time to work on the problem. (3)



The Woodland and Silver bar code can be described as a "bull's eye" symbol, made up of a series of concentric circles. While Woodland and Silver did describe such a symbol, the basic symbology was described as a straight line pattern quite similar to present day 1D bar code. (4)

The symbology was made up of a pattern of four white lines on a dark background. The first line was a datum line and the positions of the remaining three lines were fixed with respect to the first line. The information was coded by the presence or absence of one or more of the lines. This allowed 7 different classifications of articles. However, the inventors noted that if more lines were added, more classifications could be coded. With 10 lines, 1023 classifications could be coded. (5)

The Woodland and Silver patent application was issued October 7, 1952 as US Patent 2,612,994.In 1962 Silver died at age thirty-eight before having seen the commercial use of bar code. Woodland was awarded the 1992 National Medal of Technology by President Bush. Neither man made much money on the idea that started a billion dollar business. (6)

Bar code was not commercialized until 1966. The National Association of Food Chains (NAFC) put out a call to equipment manufacturers for systems that would speed the checkout process. In 1967 RCA installed one of the first scanning systems at a Kroger store in Cincinnati. The product codes were represented by "bull's-eye barcodes", a set of concentric circular bars and spaces of varying widths. These barcodes were not pre-printed on the item's packaging, but were labels that were put on the items by Kroger employees. But there were problems with the RCA/Kroger code. It was recognized that the industry would have to agree on a standard coding scheme open to all equipment manufacturers to use and adopted by all food producers and dealers. (7)

In 1969, the NAFC asked Logicon, Inc. to develop a proposal for an industry-wide bar code system. The result was Parts 1 and 2 of the Universal Grocery Products Identification Code (UGPIC) in the summer of 1970. Based on the recommendations of the Logicon report, the U.S. Supermarket Ad Hoc Committee on a Uniform Grocery Product Code was formed. Three years later, the Committee recommended the adoption of the UPC symbol set still used in the USA today. It was submitted by IBM and developed by George Laurer, whose work was an outgrowth of the idea of Woodland and Silver. Woodland was an employee at the time of IBM. (8)

In June 1974, one of the first UPC scanner, made by NCR Corp. (which was then called National Cash Register Co), was installed at Marsh's supermarket in Troy, Ohio. On June 26, 1974, the first product with a bar code was scanned at a check-out counter. It was a 10-pack of Wrigley's Juicy Fruit chewing gum. The pack of gum wasn't specially designated to be the first scanned product. It just happened to be the first item lifted from the cart by a shopper whose name is long

since lost to history. Today, the pack of gum is on display at the Smithsonian Institution's National Museum of American History. (9)

The first attempt at an industrial application of automatic identification was begun in the late 1950's by the Association of American Railroad. In 1967, the Association adopted an optical bar code. Car labeling and scanner installation began on October 10, 1967. It took seven years before 95% of the fleet was labeled. For many reasons, the system simply did not work and was abandoned in the late 1970's. (10)

The event that really got bar code into industrial applications occurred September 1, 1981 when the United States Department of Defense adopted the use of Code 39 for marking all products sold to the United States military. This system was called LOGMARS. (11)

(Adapted from the Internet sites)

3 Read the text again and answer the following questions.

a) When and where was bar code reader invented?
b) Was it done by accident or purposefully? Was it a joint or independent invention?
c) Who inspired Woodland to speed the checkout process\develop a system of automatically read product information during checkout?
d) How did the world benefit from appearance/invention of bar code reader?
e) Did bar code find immediate practical application?
f) How does bar code reader work?
g) What is it used for nowadays?
h) What are the benefits and the downsides of the invention/discovery?

Vocabulary

1 Look back in the text and find words that have a similar meaning to:

a) goods (1) b) claim (2)

c) would shine (3)
d) machine, mechanism (3)
e) was persuade (3)
f) profit (3)
g) noticed (5)
h) use (6)
i) was emerged (6)
j) was identified (7)
k) advised, suggested (8)
l) was left (10)
m) assumed (11)

2 Match the words in **A** with their definitions in **B**.

A	**B**
1) 1D	a) something that exactly achieves its aim
2) bull's-eye	b) the use, study, or interpretation of symbols
3) food chain	c) a complete, usually alphabetical list of items, often with notes giving details
4) inventory	d) the act or an instance of making purchases
5) catalogue	e) one dimensional
6) symbology	f) a counter, esp in a supermarket, where customers pay
7) shopping	g) articles of commerce; merchandise
8) goods	h) network of food shops
9) check out	i) a detailed list of articles, goods, property, etc

3 Explain the italicized parts of the following sentences in your own words.

a) Woodland took some stock market earnings, *quit his teaching job* at Drexel, and moved to his grandfather's Florida apartment to have more time to work on the problem.

b) Bar code was not commercialized until 1966. The National Association of Food Chains *put out a call to* equipment manufacturers for systems that would speed the checkout process.

c) It was submitted by IBM and developed by George Laurer, whose work was *an outgrowth of the idea* of Woodland and Silver.

4 Find these abbreviations in the text. Do you know what they stand for?

EPOS *RCA* *UPC* *NCR* *IBM*

Give your own examples of abbreviation from your field of study.

5 Complete the paragraph describing electronic payments by using EPOS and EFTPOS. Cross out the incorrect word.

EPOS (electronic point of sale) terminals are **cash**/**money** registers found in retail **openings**/**outlets** such as shops and restaurants. They are connected to a **central**/**centre** computer, and data about **objects/goods** and services sold is entered into the terminals via keyboards, barcode readers, **touch**/**finger** screens etc. They are useful for stock management, and can produce itemized bills and **receipts**/**recipes**. EFTPOS (electronic funds transfer point of sale) can also transfer **cash**/**funds** directly from the customer's bank account via a **debit**/**paying** card. They are now more common than EPOS terminals.

6 Match the words in **A** with their partner in **B.**

A	**B**
1) cash	a) and services
2) central	b) card
3) debit	c) computer
4) funds	d) of sale
5) goods	e) outlet
6) point	f) register
7) retail	g) screen
8) touch	h) transfer

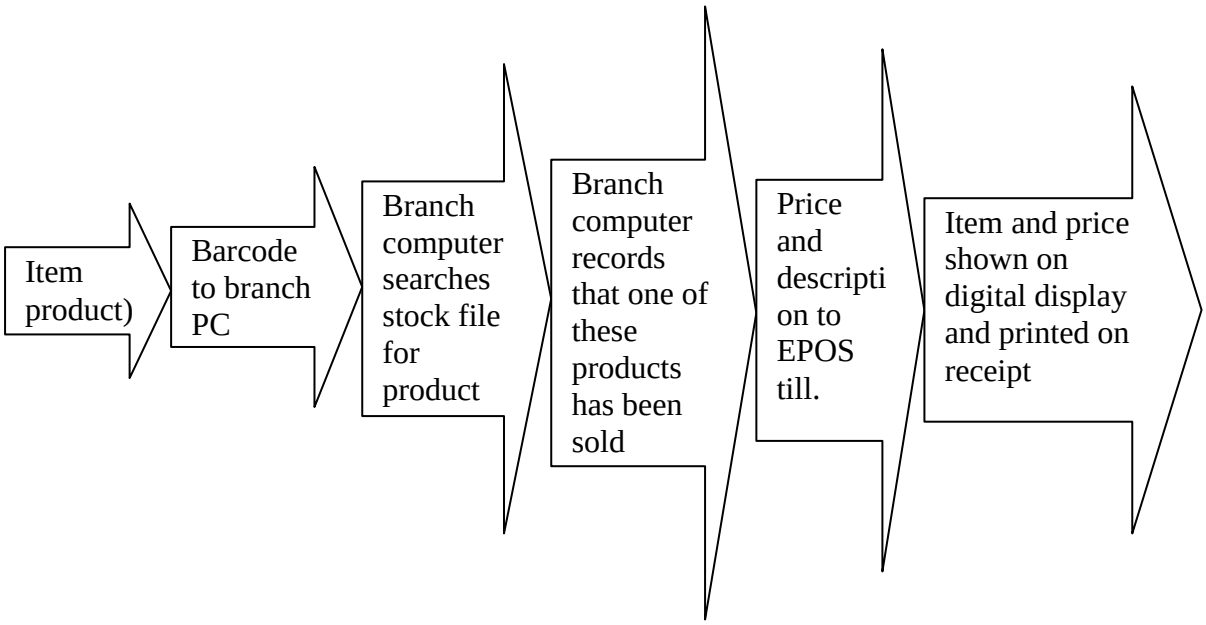
7 Give English equivalents to the following words and word combinations.

кассы (расчетная стойка); перфорационная карта, перфокарта; покупатель, потребитель; кассир (в магазине самообслуживания); выпускник университета; неустойчивость; артикул (тип изделия, товара, а также его цифровое или буквенное обозначение), превращать в источник прибыли.

Grammar

1 With the help of the diagram below, sequence these steps in the operation of an EPOS till. Then write a description of its operation in the Present Passive.

a) The scanner converts the bar code into electrical pulses.
b) The branch computer sends the price and description of the product to the EPOS till.
c) The scanner reads the barcode.
d) The branch computer records the sale of the product.
e) The till shows the items and price.
f) The checkout operator scans the item.
g) The scanner sends the pulses to the branch of computer.
h) The till prints the item and price on the paper receipt.
i) The branch computer searches the stock file for a product matching the barcode EAN.

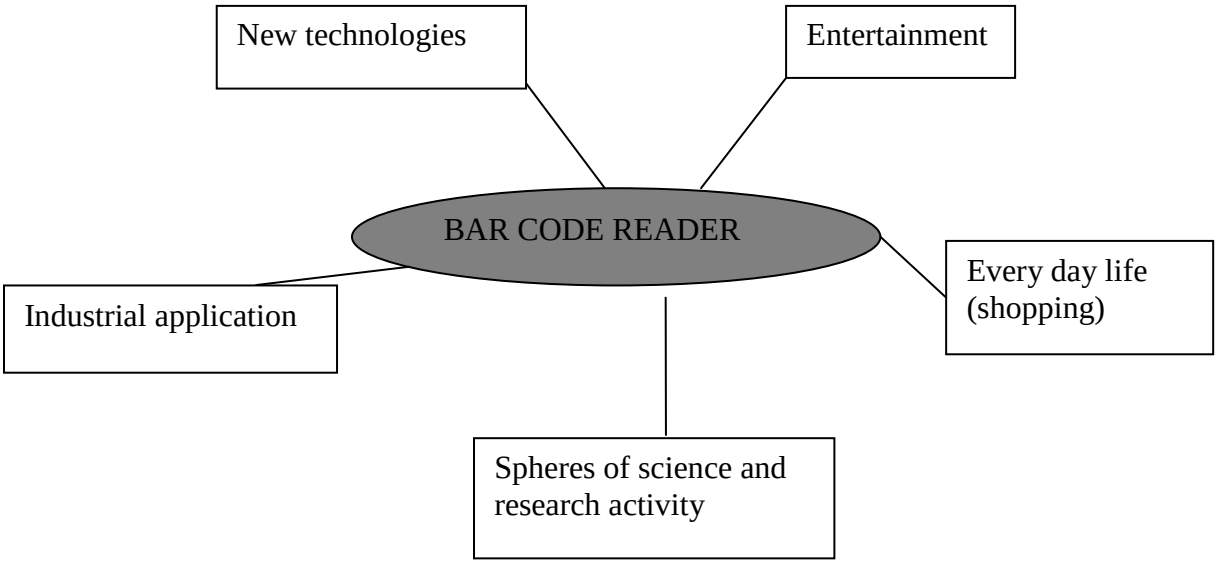


2 Translate paragraphs 3 and 9 into Russian.

Speaking

1 Sum up the text taking notes of the main steps in bar code reader evolution.

2 In small groups, choose one of the areas in the diagram below and discuss what bar code reader can do in this area.



Useful constructions
Bar code readers are used [in …….] to…..
A bar code reader also be used [in …….] for…..
Barcode can help….make….keep….manage….scan….

Project work

Work in groups of 3-4. Choose one area of bar code reader application, find comprehensive information and make a poster presentation.

Points for reflection

1 Have you learnt anything new about barcode reader from the text?

2 Has anything surprised you?

3 What facts were the most amazing?

4 Did you like the text? Why? /Why not?

Progress Test

Choose the correct answer a, b or c. There is one correct point for each answer.

1) A bar code reader was invented …

   a. purposefully. **b.** by accident. **c.** of necessity.

2) Originally it was invented in order to ….

   a. to speed up shopping.

   b. to develop a system to automatically read product information during checkout.

   c. to honor the food chain president's request.

3) A bar code finds immediate practical application in …

   a. industry and agriculture.

   b. Entertainment.

   c. everyday life – shopping.

4) The system pulled the *merchandise* automatically from the storeroom and delivered it to the checkout counter.

   a. wares **b**. goods **c.** commodities

5) These barcodes were not pre-printed … the item's packaging, but were labels that were put … the items by Kroger employees.

   a. on, out **b.** of, in **c.** on, on

6) A complete customer bill …… (to be produced) and inventory records …….. (to be update).

   a. were produced, were updated

   b. was produced, were update

   c. was produced, were updated

7) It was submitted by IBM and developed by George Laurer, whose work was *an outgrowth* of the idea of Woodland and Silver.

   a. result **b.** improvement **c.** reason

Credit points

Tasks	**Reading**	**Vocabulary**	**Grammar**	**Speaking**	**Project work**	**Points for reflection**	**Progress test**	**Total**
Maximum score	6	16	10	10	10	2	7	61
Your scores								
%								

Module 2

Photocopier

Objectives of the module:

- to develop scanning and reading for details skills
- to refresh Past Perfect to show priority
- to increase vocabulary on the topic “Inventions and discoveries”
- to learn how to sum up the information from the text using timelines
- to develop speaking skills

Before you read

1 You are going to read the text about the invention that has changed the life of many people – Xerox. Before you read answer the following questions:

a) What do you know about pre Xerox times?

b) Why was it necessary to create?

c) What are its main advantages?

d) How has this invention changed the way we live?

Reading

1 Read and pay attention to the correct pronunciation of the following words:

Xerox	['zɪərɒks]	permanent	['pɜ:mənənt]
photocopier	['fəʊtəʊˌkɒpɪə]	fixture	['fɪkstʃə]
conductivity	[ˌkɒndʌk'tɪvətɪ]	integrate	['ɪntɪgreɪt]
surface	['sɜ:fɪs]	duplex	['dju:pleks]
revenue	['revənju:]	enhancement	[ɪn'hɑ:nsmənt]
substantially	[səb'stænʃəlɪ]	donate	[dəʊ'neɪt]

2 Here are some international words from the text. Guess their meaning. Consult a dictionary if necessary.

Patent, depression, alternative, material, project, company, business, original, phase, product, corporation, model, electrostatic, investor, spectrum, copier, scanner, laser, printer.

3 Read the text and comment on its title.

The Genesis of a Dream

Necessity is often called the mother of invention. But sometimes, there are other reasons that people become innovative. For example, the driving force behind an invention can simply be a desire to eliminate tedious tasks by replacing

them with more efficient, automated option. (1)

The birth of the photocopier began with Chester F. Carlson, a patent office employee with a degree from the California Institute of Technology and a knack for tinkering. During the Great Depression, Chester Carlson was laid off from Bell Labs where he had been a research engineer and, to make ends meet, took a job at the patent office. The patent work helped to pay his bills but Carlson, whose fingers were becoming arthritic, grew weary of making the countless hand copies that his position required. The only alternative was to take photographs of the documents, but the approach proved too costly to be of regular use. He knew there had to be a better way. It wasn't long before he came to the conclusion that the relatively new field of photoconductivity held the most promise in regards to implementing his idea. One of the recent findings in this field was that the conductivity of light increases when it strikes the surface of certain materials. Thus, Carlson deduced that if an image of an original document were projected onto a photoconductive surface, electric current would flow only in those areas that the light hit directly. The print areas would be dark and block the current, leaving a specified image on the proper material. Years of this research led to a patent in 1942 for this process, called electric photography. (2)

But it took him another 20 years to find a business interested in his technology. He approached companies like IBM, GE and RCA, but was turned away. In 1960, the Haloid Company which subsequently changed its name to "Haloid Xerox" in 1958, finally brought Carlson’s idea to market. (3)

In 1949, Xerox introduced the first xerographic copier called the model A. Xerox became so successful that in North America photocopying came to be popularly known as “Xeroxing”. The company came to prominence in 1959 with the introduction of the first plain paper photocopier using the process of xerography (electrophotography) developed by Chester Carlson, the Xerox 914. The 914 was so popular that by the end of 1961, Xerox had almost $60 million in

revenue. By 1965, revenues leaped to over $500 million. Before releasing the 914, Xerox had also introduced the first xerographic printer, the "Copyflo" in 1955. The Xerox 914 was the first one-piece plain paper photocopier[1], and was sold in the thousands. (4)

The company expanded substantially throughout the 1960s, making millionaires of some long-suffering investors who had nursed the company through the slow research and development phase of the product. In 1961, the company changed its name to "Xerox Corporation". (5)

Advances allowed for color photocopies and the area of xerox art developed in the 1970s and 1980s. Some devices sold as photocopiers have replaced the drum-based process[2] with inkjet or transfer film technology. Among the key advantages of photocopiers over earlier copying technologies are: their ability to use plain (untreated) office paper, duplex printing, the ability to sort and/or staple output. (6)

In 1963, Xerox introduced the Xerox 813, the first desktop plain-paper copier, bringing Carlson's vision of a copier that could fit on anyone's office desk into a reality. Ten years later in 1973, a color copier followed. (7)

Further innovations would follow. In 1970, electrostatic printing was introduced, followed by digital printing in 1982 and digital color printing in 1983. The photocopier has become such a permanent fixture in businesses and offices across the entire spectrum of industry that it is often taken for granted. (8)

In recent years, all new photocopiers have adopted digital technology, thus replacing the older analog technology. With digital copying, the copier effectively consists of an integrated scanner and laser printer. This design has several advantages, such as automatic image quality enhancement and the ability to "build jobs" (that is, to scan page images independently of the process of printing them) and "automatic digital collation."[3]. Some digital copiers can function as high-speed

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[1] фотокопировальное устройство, печатающее на цельном листе обычной бумаги
[2] операция с использованием барабана
[3] автоматическое цифровое сличение

scanners; such models typically offer the ability to send documents via email or to make them available on file servers.(9)

So what happened to Chester Carlson, you ask? How did the insightful entrepreneur who started this whole thing fare in the Age of the Photocopier? Quite well actually. In addition to being inventive, Chester Carlson was also generous. Before he passed away in 1968 he had donated an estimated $100 million to charity. (10)

(Adapted from the Internet sites)

4 Make the timeline of the evolution of this device.

5 Read the text again and answer the following questions.

a) Who originated the idea of a photocopier?
b) What principle was used in this device?
c) What are the words that denote the process of copying the text with the help of this device?
d) What company got interested in this invention?
e) What proves the popularity of the device?
f) What were the advantages of the technology used in this device over the earlier ones?
g) What are the photocopiers like now?
h) What is unusual about the inventor of the photocopier?

6 Make the plan of the text.

Vocabulary

1 Match the words from A with the words from B as they were used in the text.

A	**B**

1) two-sided	a) force
2) driving	b) document
3) tedious	c) technology
4) automated	d) task
5) hand	e) printing
6) original	f) surface
7) digital	g) option
8) photoconductive	h) printing
9) electric	i) technology
10) electrostatic	j) copies
11) analog	k) current

Make some other expressions with the words from **B**.

2 Look back in the text and make a list of terms related to photocopying.

3 Look back in the text and find words that have a similar meaning to:

a) to destroy, to avoid (1)
b) worker (2)
c) to fire, to give a sack (2)
d) using, applying (2)
e) grow (2)
f) picture (2)
g) spot (2)
h) determined (2)
i) was refused, rejected (3)
j) substitute (6)
k) two-sided (6)
l) lasting (8)

4 Complete the following sentences with the prepositions if necessary.

a) For example, the driving force ….. an invention can simply be a desire to eliminate tedious tasks by replacing them with more efficient, automated option.
b) Chester F. Carlson had a knack ..… tinkering.
c) The only alternative was to take photographs of the documents, but the

approach proved too costly to be ..… regular use.

d) One of the recent findings in this field was that the conductivity of light increases when it strikes ..… the surface of certain materials.

e) The company came ….. prominence in 1959 with the introduction of the first plain paper photocopier.

f) With digital copying, the copier effectively consists ..… an integrated scanner and laser printer.

g) Such models typically offer the ability to send documents ..… email or to make them available on file servers.

h) Advances allowed ..… color photocopies and the area of Xerox art developed in the 1970s and 1980s.

i) He approached ….. companies like IBM, GE and RCA, but was turned away.

5 Explain the italicized part of the sentence in your own.

a) The birth of the photocopier began with Chester F. Carlson, a patent office employee with a degree from the California Institute of Technology and *a knack for tinkering*.

b) Chester Carlson was laid off from Bell Labs where he had been a research engineer and, *to make ends meet*, took a job at the patent office.

c) The Xerox 914 was the first one-piece plain paper photocopier, and *was sold in the thousands*.

d) In 1963, Xerox introduced the Xerox 813, the first desktop plain-paper copier, *bringing Carlson's vision of a copier that could fit on anyone's office desk into a reality.*

e) The photocopier has become such a permanent fixture in businesses and offices across the entire spectrum of industry that *it is often taken for granted*.

6 Give the English equivalents to the following words and word combinations:

Изобретательный, движущая сила, утомительная работа, автоматическое действие, сводить концы с концами, уставать, делать копии вручную, приходить к заключению, реализация идеи, открытия, сделать вывод, электрический ток, доход, выпуск, продавать тысячами, притворить в жизнь, заменять, двухстороннее копирование, встроенный, составлять список заданий, дальновидный предприниматель, пожертвовать на благотворительность.

Grammar

1 Rewrite the sentences and use Past Perfect to show priority and translate them into Russian.

Model: During the Great Depression, Chester Carlson was laid off from Bell Labs. He was a research engineer there. (where)

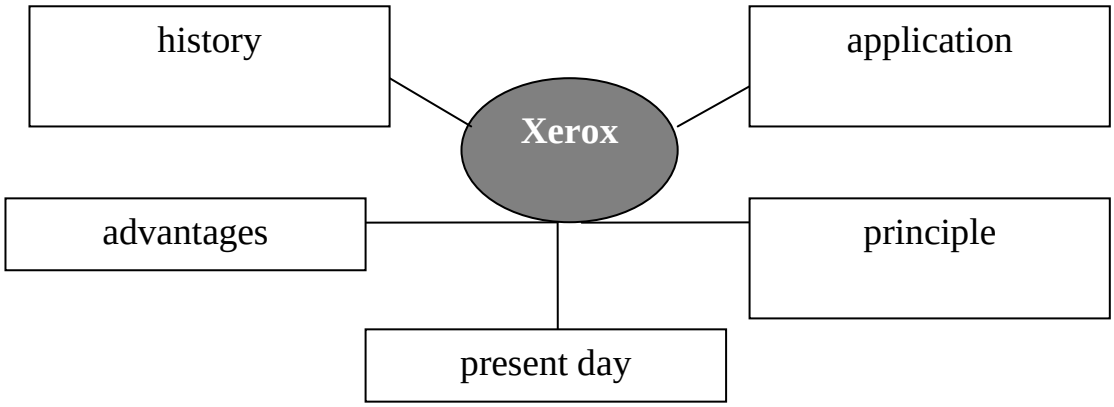
During the Great Depression, Chester Carlson was laid off from Bell Labs where he had been a research engineer – Во время Великой Депрессии Честера Карлсона уволили из лаборатории Белла, где он работал инженером в исследовательском отделе.

a) The model 914 was released. Xerox introduced the first xerographic printer, the "Copyflo" in 1955. (before)
b) He passed away in 1968. He donated an estimated $100 million to charity. (before)
c) The tinkering was over. Stibitz constructed a binary adding device. (when)
d) The first half of the 20th century saw the gradual development of the mechanical calculator. Those mechanisms were already invented. (while)

2 Translate paragraphs 2 and 6 into Russian

Speaking

1 Sum up the text using the following mind map.



2 Comment on the following statements.

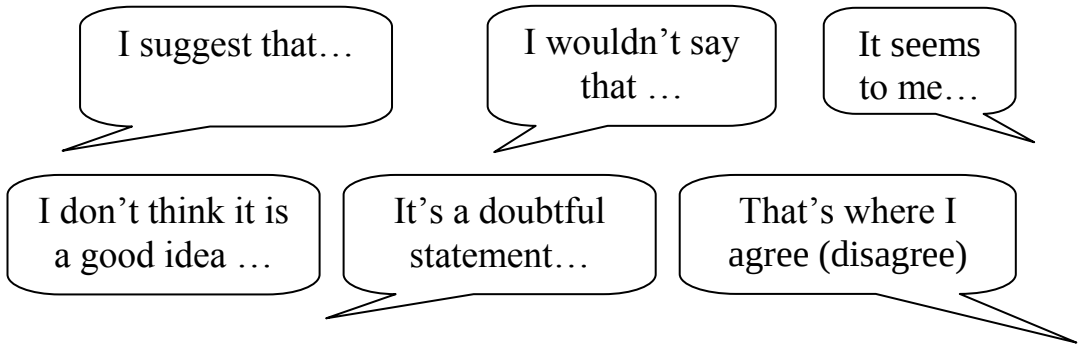
a) Today´s sleek, speedy machines are actually the result of decades of invention and refining.

b) Photocopiers have undergone substantial changes in their design and function.

c) Chester's dream has changed the world for better.

d) The advantages of Xerox made it the device we take for granted.

3 Rate the list of the things to consider before buying a photocopier according to their importance. Comment on them using the following openings:



Thing to consider when buying a photocopier:

a) the volume and type of copying you do each day

b) size

c) copy speed (pages per minute function)

d) functions

e) analogue/digital technology
f) resolution(DPI)
g) capacity tray
h) the image shift feature
i) stapling and collating capabilities
j) enlargement/reduction and zoom functions
k) linked to your office's computer network
l) integrated fax machine
m) integrated digital storage device
n) integrated computer scanners

Project work

Work in groups of 3-4. Work out the following topics to know more about photocopier. Use information from the links below and make a poster presentation.

a) Why is it called XEROX?
b) The term Xerography – why is it banned?
c) How does a photocopier work?
d) Photocopier and healthcare issues

Links

- http://news.thomasnet.com/IMT/archives/2001/04/chesters_dream.html
- http://en.wikipedia.org/wiki/Xerox
- http://www.workershealth.com.au/facts011.html

Points for reflection

1 Have you learnt anything about photocopier from the text?
2 What makes the greatest impression on you?
3 What was the most amazing fact for you?
4 Did you like the text? Why? /Why not?

Progress test

Choose the correct answer: a, b or c. There is one correct point for each answer.

1) A photocopier was invented ….

a. because Chester Carlson was bored to do hand copies that his position required.

b. because at that time there were all the conditions for someone to come up with the idea of photocopying.

c. because Chester Carlson was tired to do hand copies that his position required.

2) Chester Carlson was *laid off* from the Bells Lab.

a. unemployed **b.** promoted **c.** supported

3) The technology of photocopying was developed by Chester Carlson when he worked in …

a. Bell Labs **b.** Xerox **c.** a patent office

4) The first photocopiers implemented the principle of …

a. photography **b.** electrophotography **c.** electrostatics

5) Robots often replace people in doing *tedious* jobs.

a. boring **b.** dangerous **c.** tidy

6) Xerox means …

a. a copying device **b**. a process of copying **c.** a principle of copying

7) Chester Carlson *passed away* being successful, famous and well-to-do.

a. went past **b.** left **c.** died

Credit points

Tasks	**Reading**	**Vocabulary**	**Grammar**	**Speaking**	**Project work**	**Points for reflection**	**Progress test**	**Total**
Maximum score	12	14	10	14	10	2	7	69
Your scores								
%								

Module 3

Microscope

Objectives of the module:

- to develop reading and speaking skills
- to learn the difference between international words and false friends
- to practice word formation with prefixes
- to refresh countable/uncountable words
- to learn how to give definitions to devices
- to practice skills in translation

Before you start

1 You are going to read about invention of an optical device - the microscope. Before you read the text answer the following questions:

a) What discoveries or inventions of the ancient world do you know?

b) How did they influence the development of science at that time? Do people still use them?

c) Have any modern inventions or discoveries replaced them?

d) What is the microscope made of? What essential parts do you know?

e) What important inventions which were made by means of the microscope in the last decades of the 20th century do you know? Who made them? How did they affect people's lives?

Reading

1 Pay attention to the correct pronunciation of the following words:

microscope	[ˈmaɪkrəskəʊp]	diameter	[daɪˈæmɪtə]
renaissance	[rɪˈneɪsns]	existence	[ɪgˈzɪstəns]
compass	[ˈkʌmpəs]	distinguish	[dɪˈstiŋgwɪʃ]
image	[ˈimɪʤ]	micrometer	[maɪˈkrəmitə]
tiny	[ˈtaɪnɪ]	average	[ˈævəriʤ]
transparent	[trænsˈpærənt]	blood	[blʌd]
lens	[lenz]	bypass	[ˈbaɪpɑːs]
curvature	[ˈkɜːvətʃə]	magnifier	[ˈmægnifaɪə]
grind	[graɪnd]	yeast	[jiːst]
corpuscle	[ˈkɔpʌsl]	micron	[ˈmaɪkrən]

2 Below are some words which you will come across in the text. Write them under the correct heading. Try to guess their meaning. Consult a dictionary to check their pronunciation.

International words vs "False friends"

The words mostly of Greek and Latin origin that are used in many other languages especially in different areas of science and technology are called international words, e.g. *geometry, atom, mathematics, radio, integral, theorem, structure, etc.*

Knowledge of such words helps a lot in reading and translation. However, there are so called 'false friends". These are words that look like international but have different meanings in English and in Russian, e.g. primitive *(of or belonging to the first or beginning; original.),**to ignore** (deliberately take no notice of, pay no attention to), **argument** (disagreement, supporting reason), **actual** (real, existing in fact, etc), **spectacles** (a pair of eyeglasses, etc.*

Compass, instrument, lens, image, object, detail, crystal, to focus, philosopher, telescope, physics, principle, method, pioneer; circulation; astronomy, capillaries, glasses; bacteria; design; organisms.

International words	**False-friends**
mathematics	argument

3 Read the text about invention of the microscope and make a time line of the most essential dates and events in its development.

During that historic period known as the Renaissance, after the "dark" Middle Ages, there occurred the inventions of printing, gunpowder and the mariner's compass, followed by the discovery of America. Equally remarkable was the invention of the light microscope: an instrument that enables the human eye, by means of a lens or combinations of lenses, to observe enlarged images of tiny objects. It made visible the fascinating details of worlds within worlds. (1)

Long before someone picked up a piece of transparent crystal thicker in the middle than at the edges, looked through it, and discovered that it made things look larger. Someone also found that such a crystal focused the sun's rays and set fire to

a piece of parchment or cloth. Magnifiers and "burning glasses" or "magnifying glasses" are mentioned in the writings of Roman philosophers during the first century A. D., but apparently they were not used much until the invention of spectacles, toward the end of the 13th century. They were named lenses because they are shaped like the seeds of a lentil. (2)

The earliest simple microscope was merely a tube with a plate for the object at one end and, at the other, a lens which gave a magnification less than ten diameters -- ten times the actual size. These excited general wonder when used to view fleas or tiny creeping things and so were dubbed "flea glasses." (3)

About 1590, two Dutch spectacle makers, Zacharias Janssen and his son Hans, while experimenting with several lenses in a tube, discovered that nearby objects appeared greatly enlarged. That was the forerunner of the compound microscope and of the telescope. In 1609, Galileo, father of modern physics and astronomy, heard of these early experiments, worked out the principles of lenses, and made a much better instrument with a focusing device. (4)

The father of microscopy, Anton van Leeuwenhoek of Holland, started as an apprentice in a dry goods store where magnifying glasses were used to count the threads in cloth. He taught himself new methods for grinding and polishing tiny lenses of great curvature which gave magnifications up to 270 diameters, the finest known at that time. These led to the building of his microscopes and discoveries in biology for which he is famous. He was the first to see and describe bacteria, yeast plants, the teeming life in a drop of water, and the circulation of blood corpuscles in capillaries. During a long life he used his lenses to make pioneer studies on an extraordinary variety of things, both living and non living, and reported his findings in over a hundred letters to the Royal Society of England and the French Academy. (5)

Robert Hooke, the English father of microscopy, re-confirmed Anton van Leeuwenhoek's discoveries of the existence of tiny living organisms in a drop of

water. Hooke made a copy of Leeuwenhoek's light microscope and then improved upon his design. (6)

Later, few major improvements were made until the middle of the 19th century. Then several European countries began to manufacture fine optical equipment but none finer than the marvelous instruments built by the American, Charles A. Spencer, and the industry he founded. Present day instruments, changed but little, give magnifications up to 1250 diameters with ordinary light and up to 5000 with blue light. (7)

A light microscope, even one with perfect lenses and perfect illumination, simply cannot be used to distinguish objects that are smaller than half the wavelength of light. White light has an average wavelength of 0.55 micrometers, half of which is 0.275 micrometers. (One micrometer is a thousandth of a millimeter, and there are about 25,000 micrometers to an inch. Micrometers are also called microns.) Any two lines that are closer together than 0.275 micrometers will be seen as a single line, and any object with a diameter smaller than 0.275 micrometers will be invisible or, at best, show up as a blur. To see tiny particles under a microscope, scientists must bypass light altogether and use a different sort of "illumination," one with a shorter wavelength. (8)

The introduction of the electron microscope in the 1930's filled the bill. Co-invented by Germans, Max Knott and Ernst Ruska in 1931, Ernst Ruska was awarded half of the Nobel Prize for Physics in 1986 for his invention. In this kind of microscope, electrons are speeded up in a vacuum until their wavelength is extremely short, only one hundred-thousandth that of white light. Beams of these fast-moving electrons are focused on a cell sample and are absorbed or scattered by the cell's parts so as to form an image on an electron-sensitive photographic plate.(9)

(Adapted from the Internet sites)

4 Read the text again and answer the following questions.

a) When and how was the microscope invented?

b) What was the early microscope made of?
c) Why earlier magnifiers were named lenses?
d) What did Dutch spectacle makers discover?
e) How did Antony van Leeuwenhoek improve lenses?
f) What did Antony van Leeuwenhoek discover using the microscope?
g) How did Robert Hooke redesign Leeuwenhoek's light microscope?
h) Did European manufacturers get interested in it?
i) Who invented the electron microscope? How did it work?

Vocabulary

1 Use the prefixes in the table to form different parts of speech (nouns and verbs) from the words below.

En-	Extra-	Re-	Un-	Mis-	Dis-
encouragement	extraordinary	redesign	unload	misunderstood	disadvantage

Code, courage, cage, force, balance, joy, action, copy, adjust, agree, count, appear, appoint, close, search, load, chief, plug, type, confirm.

2 **Micro-** is a very common prefix in the sciences. There are 67 words prefixed with **micro-** in Webster's dictionary.

a) As a class, brainstorm and write as many **micro-** words as you know on the board. Consult a dictionary if necessary. How many of these words do you use?
b) Work in 4 teams. Within a minute each team works out as many words with prefixes **techno-**, **eco-**, **neo-**, and **nano-**. Then the results are checked in class. The team that writes more words is the winner.

3 Fill in the table with the missing words. Consult the dictionary if necessary:

verb	**noun**	**adjective**	**adverb**
to discover			discoverable
	magnification	magnifying	
			remarkably
	focus		
to enable			----------
to observe			observably
to vacuumize			----------
	vision		
			printability

4 Put the following words under the correct heading below. Consult a dictionary if necessary.

focus grind observe magnify shape seed glasses life

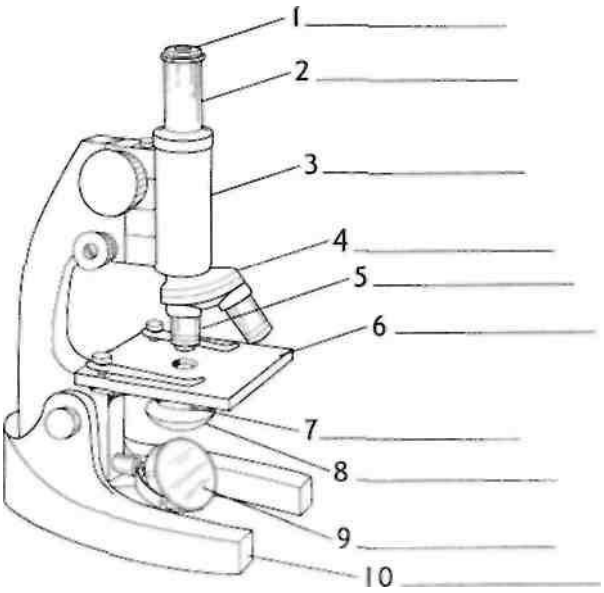
noun	both	verb

5 Look back in the text and find words that have a similar meaning to.

a) happened, took place (1)
b) found (2)
c) are formed (2)
d) expanded, increased (2)
e) complex, complicated (4)
f) beginner, novice (5)
g) being, presence (6)
h) reproduction (6)
i) visual, ocular (7)
j) to discriminate, to differentiate (8)
k) won't be visible (8)
l) are hastened (9)

6 In the sciences, a labeled diagram is often essential for a clear description. Here is a drawing of a traditional microscope.

a) Label its parts.



base drawtube condenser eyepiece mirror body tube stage revolving nose piece substage objective lenses

b) How is this microscope similar to one that you have used?
What other measuring units of wavelength do you know?
How did the microscope change our everyday life?

7 Give English equivalents to the following words and word combinations.

отвечать всем требованиям, подходить; быстрый электрон (быстро движущийся); увеличивать скорость, ускоряться в вакууме; виднеться, вырисовываться, обнаруживаться; точное оптическое оборудование; увеличительное стекло, лупа; полученные данные, добытые сведения; разработал; фокусировочное устройство; устройство сведения: посредством линзы; поджигать пергамент или ткань; существование крошечных организмов в капле воды; окрестить, дать прозвище, снабдить кличкой.

Grammar

Singular and Plural

The general rule for forming the plural is by adding the ending –s (-es) to the singular

Some uncountable nouns are used only in the singular. We do not use a(n) or a plural verb with these nouns.
e.g.

progress	*accommodation*	*information*
machinery	*permission*	*advice*

The following nouns ending in –s are usually treated as singular
News, optics, politics, economics, physics

Some of nouns are used only in plural.

peoples	*scales*	*contents*
scissors	*headphones*	*spectacles*
binoculars	*glasses*	

Some words borrowed from Latin or Greek keep their original plural forms:
Datum - data, vacua - vacuum, bacterium – bacteria.

1 Put the following nouns from the text under the correct heading.

Glasses, compass, corpuscles, findings, diameters, capillaries, lens, threads, spectacles, Physics, means, rays, clothes, fleas, goods

Singular	**Plural**

Here are some more nouns from the text. Add them to correct column.

Water, contributions, knowledge, information, equipment, blood, advice

2 Fill in the table with the missing words.

Positive	**Comparative**	**Superlative**
remarkable		
		the earliest

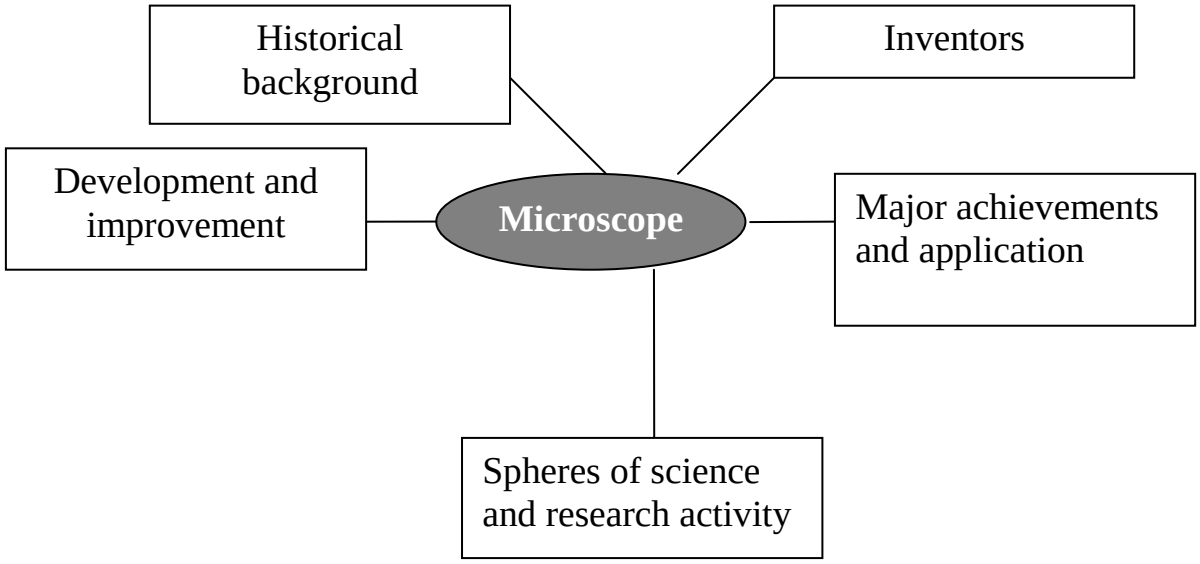
	less	
extraordinary		
	larger	

Find in the text other examples of adjectives in comparative or superlative degrees and use them in sentences of your own.

3 Translate paragraph 5 into Russian.

Speaking

1 Sum up the text expanding the following mind map.



2 Complete this cloze exercise in which every fifth word has been deleted. Use your knowledge of science and grammar, and some of the words from the box to fill in the blanks.

image	so	an	a	than	constitution		and	also	for
	rays	consisting	such	or	is	see	any	of	the

a) A dictionary definition of _____ microscope is “an instrument _____ essentially of a lens _____ a combination of lenses,

_____ making very small objects, _____ as microorganisms, look larger _____ that they can be _____ and studied."

b) An electron microscope is "_____ instrument for focusing rays _____ electrons, rather than light _____ to form an enlarged _____ of the object: it _____ much more powerful _____ any optical microscope."

2. Give definitions to the following devices.

telescope *hand magnifier* *web-camera* *binocular* *camera* *opera glasses*

How to give definitions

A definition usually include three parts:

- the term to be defined
- the group it belongs to
- the characteristics which distinguish it from other members of the group

Common words and expressions are used in definitions:

- is/are
- means
- is/are taken to be
- denotes
- is/can be defined as
- by … we mean
- by …. is/are meant
- in other words
- that is (to say)

Project work

1 Work in groups of 3-4. What other optical devices which contain lenses do you know? Complete the table below.

- Which of them do you consider most important? Why?
- Which of them are still in use?

Conventional optical devices	microscope	telescope	_____	_____	_____
Modern optical devices	Web-camera	_____	_____	_____	_____

2 Choose one device, find information about it and make a poster presentation. Make use of the hyperlinks in the Hotlist "Inventions and Discoveries that Shaped the World" (**Module 6**).

Points for reflection

1 Have you learnt anything new about a microscope from the text?
2 Has anything surprised you?
3 What facts were the most amazing?
4 Did you like the text? Why? /Why not?
5 What other magnifying devices have you learnt about?

Progress Test

Choose the correct answer **a**, **b** or **c**. There is one correct point for each answer.

1) The father of microscopy was …..
   a. Anton van Leeuwenhoek.
   b. Robert Hooke.
   c. Zacharias Janssen and his son Hans.
2) A light microscope, simply cannot be used to distinguish
   a. two lines that are closer together than 0.55 micrometers.
   b. objects that are smaller than half the wavelength of light.
   c. tiny particles with a diameter smaller than 0.75 micrometers.
3) Microscope is….
   a. an optical instrument for making distant objects appear larger and brighter by use of a combination of lenses or lenses and curved mirrors.
   b. an optical instrument that uses a lens or combination of lenses to produce a magnified image of a small, close object.
   c. a pair of lenses for correcting faulty vision, in a frame that rests on the bridge of the nose and hooks behind the ears.
4) It was the *forerunner* of the compound microscope and of the telescope.
   a. forefather **b.** ancestor **c.** predecessor

5) Someone picked … a piece of transparent crystal, looked …. it and discovered that it made things look larger; also found that such a crystal focused the sun's rays and set fire to a piece of parchment or cloth.

a. up, out **b.** into, up **c.** up, through

6) Hooke made a copy of Leeuwenhoek's light microscope and then improved upon his design.

a. of, upon **b.** on, on **c.** by, of

7) Present day instruments give …. up to 1250 diameters with ordinary light and up to 5000 with blue light.

a. Zooms **b.** focuses **c.** magnifications

Credit points

Tasks	**Reading**	**Vocabulary**	**Grammar**	**Speaking**	**Project work**	**Points for reflection**	**Progress test**	**Total**
Maximum score	8	16	14	12	14	2	7	73
Your scores								
%								

Module 4

Compact Disk

Objectives of the module:

- to practice conditional sentences
- to learn how to paraphrase ideas
- to learn how to write a summary
- to develop presentation skills
- to practice skills in translation

Before you start

1. You are going to read about one of the most influential inventions of the 20th century – the digital compact disc. Before you read the text answer the following questions:

a) What was the most popular medium for storing information in the middle of the 20th century?
b) Do you know any predecessors of the compact disc?
c) Who invented it?
d) What was the initial sphere of its application?

2 Complete the table about the digital compact disc.

things I know	things I'm not sure about	things I would like to know

Reading

2 Pay attention to the correct pronunciation of the following words.

to pursue	[pəˈsju:]	audiophile	[ˈɔ:diəʊfaɪl]
a record	[ˈrekɔ:d]	to record	[riˈkɔ:d]
binary	[ˈbaɪnəri]	succeed	[səkˈsi:d]
although	[ɔ:lˈðəʊ]	through	[Θru:]
to inspire	[ɪnˈspaɪə]	to envision	[ɪnˈvɪʒn]
encyclopedia	[ˌɪnsaɪkləˈpi:diə]	employee	[ɪmˈplɔii:]
to initiate	[ɪˈniʃɪeɪt]	to determine	[dɪˈtɜ:mɪn]

3 Read the text about a digital compact disc and comment on the title. Do you share this point of view?

Edison would Certainly Wonder!

Many people think that the compact disc now commonplace in stereos and computers arouse in the 80th. But the truth is that it was invented in the late 1960s by James T. Russell. (1)

Russell was born in Bremerton, Washington in 1931. He earned a BA in Physics from Reed College in Portland in 1953. Afterward, he went to work as a physicist in General Electric's nearby labs in Richland, Washington. (2)

At GE, Russell initiated many experimental instrumentation projects. But in 1965 he joined the Pacific Northwest Laboratory of Battelle Memorial Institute in Richland as Senior Scientist. He already knew what avenue of research he wanted to pursue. (3)

Russell was a music listener. Ever since the invention of the phonograph in 1876, music has been a popular source of home entertainment. Like many avid audiophiles of the time, he was continually frustrated by the wear and tear suffered by his vinyl (ai) phonograph records. He was also unsatisfied with their sound quality: his experimental improvements included using a cactus needle as a stylus. Alone at home on a Saturday afternoon, he began to sketch out a better music recording system --- and was inspired with a truly revolutionary idea. (4)

Russell envisioned a technology that would record and replay sounds without physical contact between its parts; and he saw that the best way to achieve such a system was to use light. Russell was familiar with digital data recording in punch card or magnetic tape form. He saw that if he could represent the binary 0 and 1 with dark and light, a device would read sounds or indeed any information at all without ever wearing out. If he could make the binary code compact enough, Russell saw that he would be able to store not only symphonies, but entire encyclopedias on a small piece of film! (5)

Thus after years of work, Russell succeeded in inventing the first digital-to-optical recording and playback system (patented in 1970). He had found a way of recording onto a photosensitive platter in tiny "bits" of light and dark, each one micron in diameter; a laser read the binary patterns, and a computer converted the data into an electronic signal - which it was then comparatively simple to convert into an audible or visible transmission. (6)

This was the first compact disc. Although Russell had once envisioned 3x5-inch stereo records that would fit in a shirt pocket and a video record that would be about the size of a punch card, the final product imitated the phonographic disc which had been its inspiration. Though he successfully exhibited his invention many times, the investors and the scientists were very skeptic. The investments seemed to them to be very long-term and the profits too distant. But this technology was finally funded by a venture capitalist, Eli Jacobs, who started the Optical Recording Corporation in 1971, hiring Russell and a number of his colleagues. Soon Sony, Phillips and other audio companies realized the implications and purchased licenses. Nevertheless, Optical Recording Corporation was the winner of a patent infringement lawsuit[4] in 1992, finally confirming that it alone could claim ownership of the patents for the Compact Disc. Although the award was about $30 million, Russell didn't see a penny of it as he was merely an employee of Optical Recording. (7)

Perhaps one relatively unknown trivia about the compact disc concerns its size, the playing length and the size of the hole in the middle which were determined during negotiations between Philips and Sony in the 1980s. They figured that the size of a Heineken beer coaster would be "in the ballpark"[5]. The hole in the middle is exactly the size of a Dutch dime. This means that if you put a Dutch 10 cent coin in the center hole it will fit but won't fall through. Amazing! (11)

[4] судебный процесс по делу о нарушении патентных прав
[5] диапазон, внутри которого возможно сопоставление

The playing length was determined by the Japanese. The wife of Akio Morita, the president of Sony, played classical music, among which was her favourite Beethoven's 9th (72 minutes). This had to fit on the CD. So, the maximum length of the compact disc was set at 75 minutes. (8)

James T. Russell has many interests beyond optical data devices. In fact, he has claimed, "I've got hundreds of ideas stacked up - many of them worth more than the compact disc. But I haven't been able to work on them." Digital engineers and consumers alike will be lucky if he does find the time. (9)

(Adapted from the Internet sites)

4 Now close the text and try to remember any 3 facts about James T. Russell and his invention that were new for you.

5 Answer the following questions.

a) What qualification did Russell get?
b) Why did he decide to create a new type of recording system?
c) What idea was at the heart of his technology?
d) What were the most essential advantages of a new device over the phonographic disc?
e) Was his invention funded at once? Why? Why not?
f) What other devices for storing and transporting information did Russell envision?

Vocabulary

Working with vocabulary

Don't forget to keep a record of the words and expressions that you have learnt, review your notes from time to time and try to use new vocabulary items whenever possible.

1 Match a word in column **A** with the word or phrase in column **B** to make word combinations from the text.

A	B
1) initiate	a) corporation
2) avenue of	b) pattern/code
3) achieve	c) research
4) envision	d) laboratory
5) exhibit	e) system
6) join	f) invention
7) binary	g) project
8) start	h) technology

Choose 3 word combinations and make the sentences of your own.

2 Cross out an odd word in each line. Suggest an appropriate word for the odd ones.

a) to earn: profit, a degree, respect, a prize
b) to record: sound, a sentence, voice, an image
c) to store: records, information, one's word, a file.
d) to convert: opinion, money, a signal, data.

3 From the box below, choose one word which could be used in place of the words in **bold** without changing the meaning of the sentence.

frustrated unsatisfied realized imitated invested envisioned exhibited

a) When the leading recording companies **understood** the significance of his invention, they offered him to purchase the license.
b) Russell was **not pleased** with the quality of the sound and continually **upset** by the wear and tear suffered by his vinyl phonograph records.
c) Like many ideas far ahead of their time, the CD technology **was not**

sponsored at first.

d) Though he successfully **demonstrated** his invention many times, the investors and the scientists were very skeptic.

e) The final product **copied** the phonographic disc which had been its inspiration.

f) Russell **foresaw** a technology that would record and replay sounds without physical contact between its parts.

4 Complete the sentences with prepositions if necessary.

a) In 1965 he joined ….. the Pacific Northwest Laboratory.

b) Russell began to sketch … a better music recording system --- and was inspired ….. a truly revolutionary idea

c) Russell was familiar ….. digital data recording in punch card or magnetic tape form.

d) Russell succeeded ….. inventing the first digital-to-optical recording and playback system

e) A computer converted the data ….. an electronic signal

f) But finally this technology was funded ….. a venture capitalist.

5 Look back in the text and explain the phrases and sentences in italics in your own words.

a) He already knew what *avenue of research he wanted to pursue.* (3)

b) Although the award was about $30 million, *Russell didn't see a penny of it.* (7)

c) Like many *avid audiophiles* of the time, he was continually frustrated by the sound quality. (?)

d) "*I've got hundreds of ideas stacked up*- many of them worth more than the compact disc"

e) By 1985, Russell had earned 26 patents for CD-ROM technology, now *commonplace* in stereos and computers.

6 Give English equivalents to the following words and word combinations.

Обычный (банальный), работать кем-либо, получать/добиваться чего-либо, область исследования, запись/записывать, улучшение/ усовершенствование, быть недовольным/неудовлетворенным, делать наброски/предварительные разработки, быть вдохновленным чем-либо, предвидеть/представить систему, быть знакомым с/иметь представление о, цифровые данные, хранить информацию, преобразовывать, преуспеть в чем-либо, демонстрировать изобретение, финансироваться, основать корпорацию, работник, длительность проигрывания.

Grammar

Conditional Sentences	
If you don't pour the flowers they die out.	Zero condition.
If the weather ***is*** nice tomorrow we ***will go*** to the park.	True condition in the Present and Future
If the weather ***was*** nice today we ***would go*** to the park.	Untrue condition in the Present and Future
If the weather ***had been*** nice yesterday we ***would have gone*** to the park.	Untrue condition in the Past

1 Put the verb into the correct form. Use the prompts in brackets. Then translate the sentences.

a) If he (can) represent the binary 0 and 1 with dark and light, a device (read) sounds or indeed any information at all. (imaginary situation)

b) This means that if you (put) a Dutch 10 cent coin in the center hole it (fit) but (fall) through.(real situation)

c) If he (can) make the binary code compact enough, Russell saw that he (can) store not only symphonies, but entire encyclopedias on a small piece of film! (imaginary situation)

d) Digital engineers and consumers alike (to be) lucky if he (find) the time. (real situation)

2 Match the two parts of the sentences. Then translate them.

1) He will find enough money to promote his invention	a) more classifications would be coded
2) When a computer converts the data into an electronic signal	b) then the machine would be deemed intelligent
3) However, the inventors noted that if more lines were added,	c) if the investors realize its commercial value
4) If a person could hold a typed conversation with "somebody" else, not realizing that a computer was on the other end of the wire,	d) it will be then comparatively simple to convert into an audible or visible transmission

3 Translate paragraphs 4, 5, 6 into Russian.

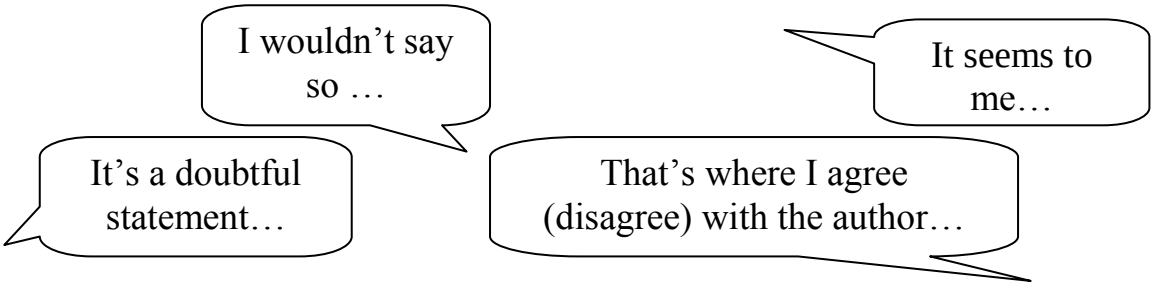
Speaking

1 Look through the text and divide it into logical parts. Entitle each part. Summarize the text in no more than 10 sentences using your key points.

Summary writing

1) Read the text again and underline the key words and sentences.
2) Write summary in your own words.
3) Follow the structure of the original text.
4) The objective of the summary is your point of view.
5) Always check if your summary coincides with the original idea of the text

2 Comment on the following statements made by people who were contemporaries of the first compact discs. Use the following openings.



a) "When the first disc was produced it sparkled a global music revolution." (Piet Kramer, a member of the optical group at Philip's during the disc's development)

b) "…. as CDs are a digital format, they actually kick-started the digital age." (Richard Gooch, head of technology at the International Federation of the Phonographic Industry)

c) "From now on, the conventional record player is obsolete. Throw in into the dustbin." (Lou Ottens, technical director of the audio division at Philips)

Project work

3 Work in groups of 3-4. Make a timeline and a poster presentation of the most influential storage devices that ever existed/s. Make use of the hyperlinks in the Hotlist "Inventions and Discoveries that Shaped the World" (**Module 6**).

Points for reflection

1 Have you learnt anything new from the text?
2 Has anything surprised you?
3 What facts were the most amazing?
4 Did you like the text? Why? /Why not?

Progress test

Choose the correct answer: a, b or c. There is one correct point for each answer.

1) While inventing the first compact disc Russell's main task was to:

a. create a system without any physical contact between its parts

b. find the way to store big amount of information

c. both

2) Alongside with the invention of the compact disc Russell envisioned :

a. a video record **b.** a phonographic disc **c.** a punch card

3) It was a technology that could …. sounds without physical contact between its parts.

a. introduce **b.** represent **c.** record

4) James T. Russell is famous for the *invention* of a compact disc.

a. discovery **b.** investigation **c.** opening

5) Russell succeeded .... inventing the first digital-to-optical recording and playback system.

a. at **b.** with **c.** in

6) If he could imagine this new technology …

a. he would certainly brought it into life

b. he will certainly brought it into life

c. he will certainly brought it into life

7) I am sure, they will help you …

a. if you will explain the problem

b. if you explained the problem

c. if you explain the problem

Credit points

Tasks	**Reading**	**Vocabulary**	**Grammar**	**Speaking**	**Project work**	**Points for reflection**	**Progress test**	**Total**
Maximum score	8	14	14	8	10	2	7	63
Your scores								
%								

Module 5

Robots

Objectives of the module:

- to practice reading for details
- to learn how to recognize ***–ing*** forms
- to use word webs for increasing vocabulary
- to practice commenting skills
- to develop presentation skills

Before you read

You are going to read about robots and their historical background. Before you read the text answer the following questions.

1) What comes to your mind when you think about robots?
2) How does a typical robot look like in your opinion?
3) Have you ever seen a real robot?
4) Who built the first robot?
5) What are the main spheres of robot application?

Reading

1 Pay attention to the correct pronunciation of the following words.

Czech	[tʃek]	manufacture	[ˌmænjuˈfæktʃə]
automation	[ɔ:təˈmeɪʃn]	integrated	[ˈntɪgreɪtɪd]
successful	[səkˈsəsfl]	circuit	[ˈsɜ:kɪt]
commercial	[kəˈmɜ:ʃl]	artificial	[ˌɑ:tiˈfiʃl]
perform	[pəˈfɔ:m]	processor	[ˈprəʊsəsə]
variety	[vəˈraɪətɪ]		

2 Read the text and comment on the title.

The Stuff of Space Movies

If you think robots are mainly the stuff of space movies, think again. Right now, all over the world, robots are on the move. They're painting cars at Ford plants, assembling Milano cookies for Pepperidge Farms, walking into live volcanoes, driving trains in Paris, and defusing bombs in Northern Ireland. As they got tougher, nimbler[6] and smarter, today's robots are doing more and more things we can't –or don't want to–do. There's no precise definition, but by general agreement a robot is a programmable machine that imitates the actions or appearance of an intelligent creature–usually a human.(1)

Robots have been with us for less than 50 years, but the idea of inanimate

[6] проворнее

creations to do our bidding[7] is much, much older. The ancient Greek poet Homer described maidens of gold, metallic helpers for the Hephaistos, the Greek god of the forge[8]. The golems of medieval Jewish legend were robot-like servants made of clay, brought to life by a spoken charm. Leonardo da Vinci drew plans for a mechanical man in 1495. (2)

The Industrial Revolution stimulated the invention of elementary robot mechanisms to perfect the production of power itself. The later 19th and early 20th centuries saw a rapid proliferation of powerful machinery in industrial operations. These at first required a person to position both the work and the machine, and later only the work. Automatic cycle-repeating machines (automatic washers), self-measuring and adjusting machines (textile colour-blending equipment), and machines with a degree of self-programming (automatic elevators) soon followed. (3)

The word robot comes from the Czech word «robota», meaning drudgery[9] or slave-like labor. It was first used to describe fabricated workers in a fictional 1920s play by Czech author Karel Capek called Rossum's Universal Robots. In the story, a scientist invents robots to help people by performing simple, repetitive tasks. The word 'robotics' was first used in Runaround, a short story published in 1942, by Isaac Asimov. One of the first robots Asimov wrote about was a robotherapist. But real robots wouldn't become possible until the 1950's with the invention of transistors and integrated circuits. (4)

After the technology explosion during World War II, in 1956, a historic meeting occurred between George C. Devol, a successful inventor and entrepreneur, and engineer Joseph F. Engelberger, who were discussing the writings of Isaac Asimov over cocktails. Together they made a serious and commercially successful effort to develop a real, working robot. (5)

Engelberger started a manufacturing company 'Unimation' which stood for universal automation and so the first commercial company to make robots was

---

[7] приказ, распоряжение
[8] кузница
[9] нудный, монотонный

formed. Devol wrote the necessary patents. Their first robot was nicknamed the 'Unimate'. As a result, Engelberger has been called the 'father of robotics.' Without any fanfare, the world's first working robot joined the assembly line at the General Motors plant in the spring of 1961. It was nothing like the metallic humanoid mechanism resembling the ones seen in movies and on television in those days in America and Japan. (6)

The first Unimate was installed at a General Motors plant to work with heated die-casting machines. In fact most Unimates were sold to extract die castings from die casting machines and to perform spot welding on auto bodies, both tasks being particularly hateful jobs for people. Its most distinct feature was a grip on a steel armature that eliminated the need for a man to touch car parts just made from molten steel. The Unimate took a few years to turn a profit and nobody at GM complained. Soon both the American and Japanese societies were poised and ready for automation on a large scale. (7)

Today, at age 73, Engelberger is marketing a robot that looks a bit like R2-D2 from "Star Wars." It's rolling around in 70 hospitals, delivering medicine and messages to patients and nursing stations. As for his first robot, Unimate, Engelberger said he was sure he could get it up and running again if the Smithsonian would let it out of the museum.(8)

Current robots have advanced sensory systems that process information and appear to function as if they have brains. Their "brain" is actually a form of computerized artificial intelligence (AI). AI allows a robot to perceive conditions and decide upon a course of action based on those conditions. As computer processors are getting faster and cheaper, robots can afford to get smarter. Meanwhile, researchers are working on ways to help robots move and "think" more efficiently. Although most robots in use today are designed for specific tasks, the goal is to make universal robots, robots that are flexible enough to do absolutely anything a human does–and even more. (9)

(Adapted from the Internet sites)

3 Now close the text and try to remember any 3 facts about robots that were new for you.

4 Read the text again and choose the correct option.

1) A robot is:
   a) a machine that looks and behaves like a human being
   b) a machine that helps people to perform simple, repetitive tasks
   c) a programmable manipulator that is used by people for different uses
2) The appearance of robots wouldn't be possible without:
   a) the invention of transistors and integrated circuits.
   b) computerized artificial intelligence
   c) a fictional play by Czech author Karel Capek
3) Robots became so important marketable product thanks to
   a) its commercial success
   b) its ability to work in dangerous environment and perform difficult tasks
   c) its popular use in movies
4) An ideal future robot is able to
   a) process information and function as if it has brains
   b) be flexible enough to do absolutely everything a person can do
   c) work beyond human potential

Vocabulary

1 Match a word in column **A** with the word or phrase in column **B** to make word combinations from the text.

A	**B**
9) artificial	i) circuit
10) perceive	j) an effort
11) proliferation of	k) creature
12) integrated	l) information

13)	make	m) tasks
14)	intelligent	n) intelligence
15)	perform	o) condition
16)	process	p) machinery

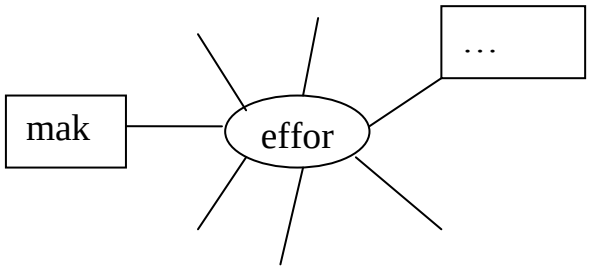
Choose 3 word combinations and use them in the sentences of your own.

2 Look back in the text and find the words and phrases that go with the following words.

perfect position nickname extract market process function

What parts of speech are the words **in bold**? Write two sentences to demonstrate different functions of every word.

3 Within 1 minute complete the word web below with as many verbs as possible.



How to increase vocabulary

Word webs may be a good solution if you have a problem remembering new items of vocabulary and word collocations. They help you not only memorize a word but also learn phrases and collocations with these words.

4 Draw a word web for the verb *to invent*. Use a dictionary if necessary.

5 Work in 4 teams. Each team completes word webs for the verbs *require, decide, resemble and develop* using its own colour marker. Mind maps are

rotated every 1 minute, and then the results are checked in class. The team that works out the majority of combinations is the winner.

6 Find out all the words and phrases in the text which are used to describe robots. Add 2 word combinations of your own.

7 Give English equivalents to the following words and word combinations.

Точное определение, программируемая машина, разумное существо, совершенствовать производство энергии, распространение машинного оборудования, определять местоположение, выполнять повторяющиеся операции, интегральная микросхема, предпринять попытку, устанавливать, напоминать (быть похожим), автоматизация в крупных масштабах, обрабатывать информацию, функционировать, становиться умнее.

Grammar

1 Complete the table below with ***–ing*** forms from the text. Translate the sentences they are used in.

How to recognize –*ing* forms

1. Adjective: You can guess the adjective from the words which come before or after it,
e.g. *an exciting subject*; *exciting* must be an adjective as it comes between the article *a* and the noun *subject*

2. **Verbal noun**: formed from verbs by adding ***–ing*** to the stem of the verb, but it is free from any verbal function. They can not express action, they only names the action. Often used with the article *a* or *the* and function as a subject, *e.g.* a *meeting* between two scientists.

3. **Gerung:** a part of speech formed from verbs by adding ***–ing*** to the stem of the verb. Names actions and functions as a subject, an object (after verbs). Often used with prepositions, *e.g.* I like *reading* very much. She typed 5 pages without *stopping*.

4. **Continuous verb form:** it combines with a form of the auxiliary verb *to be* and express a continuous action, *e.g.* We are *trying* to develop a new model

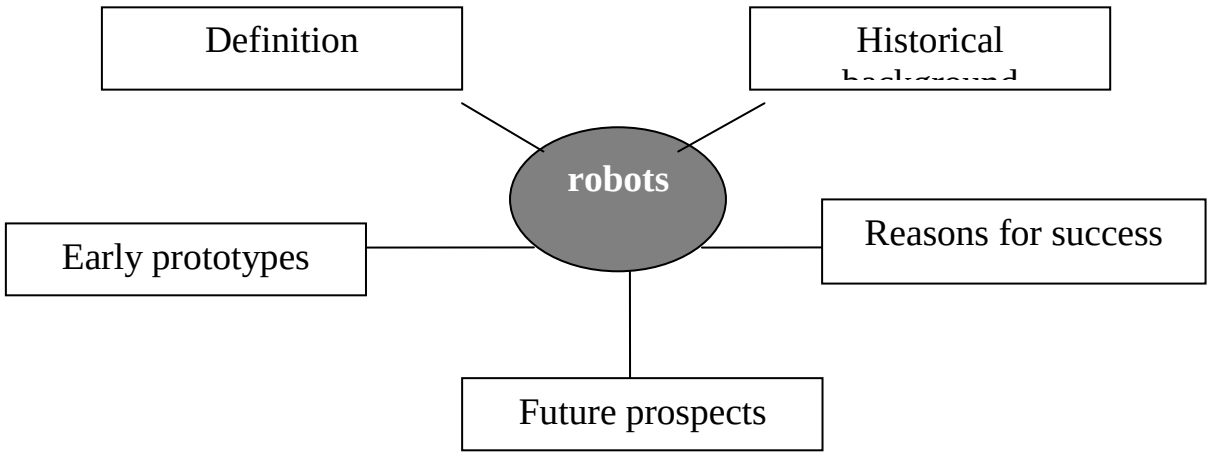
5. **Participle I:** it is never used with articles or pronouns, can follow prepositions. In a sentence it forms a clause that adds details to the main clause:

- when two things happen at the same time, *e.g.* She was sitting in an arm chair *reading* a book (= *and read* a book).
- When one action happens during another, *e.g.* Be careful (when/while) *crossing* the street. (= when/while you *are crossing* the street).
- To explain something or give reason to something, *e.g. Being unemployed*, he hasn't got much money (because he *was unemployed*).

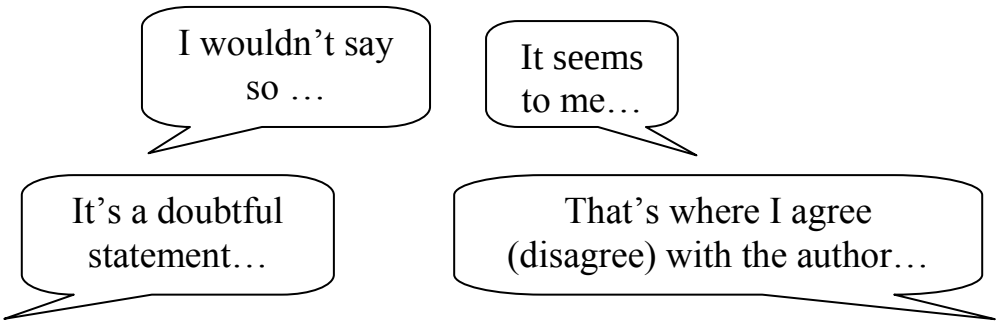
Verbal noun	Gerund	Adjective	Participle I	Continuous verb form

Speaking

1 Sum up the text using the following mind map.



2 Comment on the following quotations using the openings:



a) In an essay written in 1935, K. Capek strongly fought the idea that robots were at all possible and, writing in the third person, said:
"It is with horror, frankly, that he rejects all responsibility for the idea that metal contraptions could ever replace human beings, and that by means of wires they could awaken something like life, love, or rebellion. He would deem this dark prospect to be either an overestimation of machines, or a grave offence against life"

b) "Perhaps the most dramatic changes in future robots will arise from their increasing ability to reason"

c) Nowadays the robotics revolution is already beginning to change the kind of work that people do.

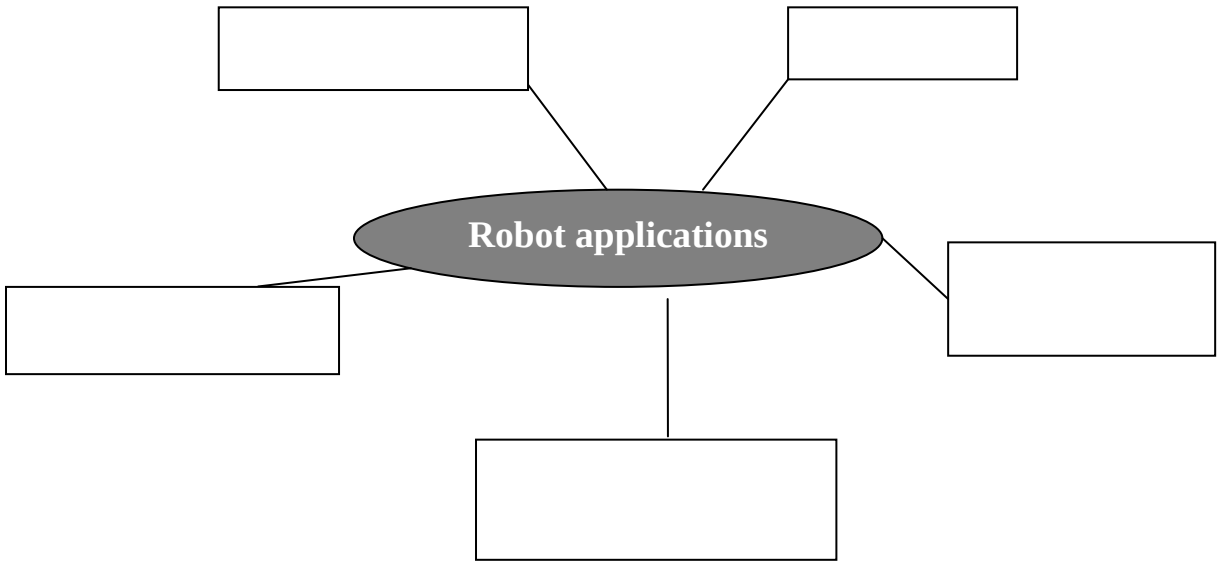
3 Read the following definitions of robots suggested by the leading specialists working in the area of artificial intelligence. Do you share their opinion? How would you define a robot?

a) "It's a machine that can sense and act and react in the world and possibly involves some reasoning for performing these actions, and it does so autonomously. By that definition a thermostat would be a robot. Though it's not 'aware' it has a goal, that awareness isn't required." (Alan Mackworth, the director of the University of British Columbia Laboratory for Computational Intelligence and president of the American Association for Artificial Intelligence)
b) "To me a robot is something that has some physical effect on the world, but it does if it is based on how it senses the world and how the world changes around it." (Rodney Brooks, the director of the Massachusetts Institute of Technology computer science and artificial intelligence laboratory)
c) "They have to have a way of making measurements of the world, they have to have a way of making decisions — in other words, something like a computer, you could call that thinking informally — and they have to have a way taking actions." (Gregory Dudek, the director of the Centre for Intelligent Machines at McGill University in Montreal, sets three criteria for robots.)
d) "I can't define a robot, but I know one when I see one." (Joseph Engelberger has been called the father of robotics)

Project work

1 Work in groups of 3-4. Discuss the areas of robot applications and what robots can do in this area. Complete the diagramme below.

2 Choose one area of application in the diagramme, find comprehensive information and make a poster presentation.



Points for reflection

1 Have you learnt anything new from the text?

2 Has anything surprised you?

3 What facts were the most amazing?

4 Did you like the text? Why? /Why not?

Progress test

Choose the correct answer **a**, **b** or **c**. There is one correct point for each answer.

1) The invention of elementary robots was stimulated by …

   a. the industrial revolution **b.** fantastic movies **c.** science fiction

2) Current robots have advanced sensory systems that function as …

   a. if they have ability to reason **b.** if they have senses

   c. if they can perform any kind of tasks

3) A robot is a programmable machine that could ……. the human actions.

   a. copy **b.** emulate **c.** imitate

4) Thanks to the computerized artificial intelligence robots have ability *to reason.*

   a. to think **b.** to understand **c.** to function

5) Even during the war he didn't stop *producing* new mechanisms

a. verbal noun **b.** gerund **c.** participle I

d. adjective **e.** Present Continuous verb form

6) The engineers *constructing* the gas pipeline came across many difficulties.

a. verbal noun **b.** gerund **c.** participle I

d. adjective **e.** Present Continuous verb form

7) He is still *making* his efforts to create a new mechanical man that looks like an intelligent creature

a. verbal noun **b.** gerund **c.** participle I

d. adjective **e.** Present Continuous verb form

Credit points

Tasks	**Reading**	**Vocabulary**	**Grammar**	**Speaking**	**Project work**	**Points for reflection**	**Progress test**	**Total**
Maximum score	8	14	4	12	14	2	7	61
Your scores								
%								

Module 6

Follow Up Activities

Objectives of the module:

- to consolidate vocabulary on the topic “Inventions and Discoveries”
- to help in preparing poster presentations
- to motivate students to participate in conferences
- to provide materials for further reading
- to provide extra credit tasks

1 Look at the pictures. In pairs try to identify the devices. Are they used nowadays? Were they replaced by the modern successors? Then match the pictures with names of devices in the box.

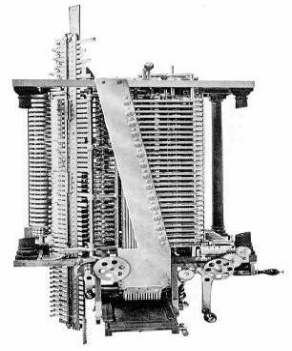
1) 

2) 

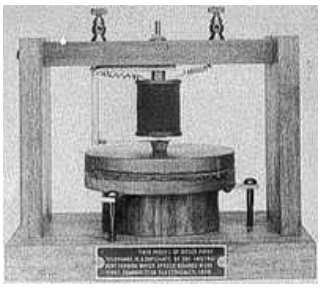
3) 

4) 

5) 

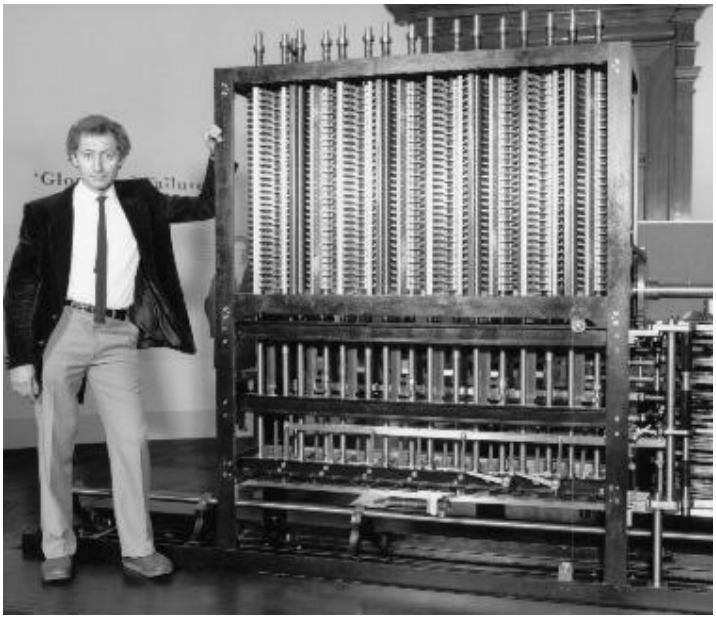
6) 

7) 

8) 

9) 

10) 

11) 

a remote control	a type writer	a telephone	microscope
an analytical engine	a photocopier	calculator	

2 Match the devices and machines with their explanations.

1) the abacus	a) the machine used by H. Hollerith in 1890 to read the US census
2) Pascal's Gear System, called Pascaline	b) the company that designed the first microprocessor in 1971
3) Tabulating machine	c) the first mechanical calculator
4) Z3, the first machine to work on the binary system	d) the device used in China as a calculating machine, 4000 years ago
5) the Harvard Mark-I	e) the device designed by Alan Turing to perform logical operations
6) the Turing Machine	f) the first computer with a graphical user interface and a mouse
7) ENIAC	g) the giant machine which had more than 2,000 vacuum tubes
8) Intel	h) the computer developed by Konrad Zuse in 1941
9) the Apple Macintosh	i) the digital computer built by engineers at IBM and H. Aiken in 1950

3 Match the types of cards with their purposes.

1) credit card	a) Buy now, pay now.
2) debit card	b) Buy now, pay the bank later.
3) cash card	c) Buy now, pay the shop later.
4) loyalty card	d) Spend, and get some money or goods back from the shop.
5) store card	e) Take money out of a cash machine.

4 Make a poster presentation (group work).

Step One - Brainstorm and discuss the ideas on what points to highlight in your poster.

Step Two - Develop the materials you want to include in your poster into separate paragraphs. Write each paragraph on a separate piece

of paper.

Step Three - Structure your text. Discuss the order and place of each paragraph on your poster.

Step Four - Proofread the material checking the spelling, punctuation, grammar and vocabulary.

Step Five - Choose a person to design the poster. Help him/her to make necessary additions (photos, diagrammes, etc.)

Step Six - Choose a person to present your poster in class. Help him/her with the pronunciation and intonation.

Step Seven - Pin the poster on the wall of the classroom and make your presentation.

5 To find information on other inventions and discovries in the fields of information technologies, physics, mathematics, engineering, use Hotlist «Inventions and Discoveries that Shaped the World».

Inventions and Discoveries
that Shaped the World

"Necessity is the mother of invention" Plato

Individual reading is an integral part of the English language course that allows you to widen the limits of any topic you study. The hotlist "Inventions and Discoveries that Shaped the World" brings you face-to-face with the extraordinary inventions, amazing discoveries and fabulous innovations that changed our world either for good or for ill. It is an index of supplementary reading material.

Individual reading class takes place once a month. The requirements are:

1. Choose a scientist or inventor who made a significant contribution into further development of physics, engineering, mathematics, computer science, information technology, systems analysis.

2. Read and translate into Russian the biography of the scientist/inventor (5000 characters).

3. Sum up the information you have read in no more than 10 sentences, highlighting the most important and interesting facts in the scientist/inventor's life and work.

4. Practice reading aloud one of the paragraphs – check the pronunciation of the proper names, terms, etc.

Links:

- http://inventors.about.com/od/famousinventions/Famous_Invention_From_A_to_Z_Find_Any_Famous_Invention.htm - Famous Invention - From A

to Z

- http://inventors.about.com/gi/dynamic/offsite.htm?zi=1/XJ&sdn=inventors&cdn=money&tm=96&gps=223_1796_1436_732&f=11&tt=2&bt=1&bts=0&zu=http%3A//www.popsci.com/popsci/flat/bown/2006/ - Popular Science Best of What's New 2006
- http://www.historylearningsite.co.uk/inventions_1900_to_1990.htm - inventions from 1900 to 1990
- http://inventors.about.com/gi/dynamic/offsite.htm?zi=1/XJ&sdn=inventors&cdn=money&tm=36&gps=228_1775_1436_732&f=11&tt=2&bt=1&bts=0&zu=http%3A//www.time.com/time/2006/techguide/bestinventions/ - Time Magazine Modern Inventions of the Year 2006
- http://www.geocities.com/worldview_3/inventions.html - notable inventions, etc
- http://www.historyworld.net/wrldhis/PlainTextHistories.asp?groupid
- http://encarta.msn.com/artcenter_0/Encyclopedia_Articles.html#tcsel
- http://www.infoplease.com/ce6/sci/
- http://www.britishcouncil.org/science-cubed.htm
- http://inventors.about.com/od/inventionhistory/More_History_of_Inventions.htm
- About:Inventors - http://inventors.about.com/library/bl/bl1_1.htm

Help resources:

- Free Russian English Dictionary and English to Russian online http://www.rustran.com/
- Online Dictionary, Language Guide, Foreign Language and Etymology - allows sound http://www.allwords.com/
- Dictionary - MSN Encarta - Online dictionary with over 100000 entries, definitions, and pronunciation http://encarta.msn.com/encnet/features/dictionary/dictionaryhome.aspx

6 Participate in a Student Conference

Hold a mini-conference in your group devoted to the outstanding people in your field of science (information technologies, mathematics, physics, engineering, systems analysis). Prepare a five-minute presentation on the scientist's biography and work.

a) Find information on any scientist or inventor who is the most interesting from the point of view of the biography and contribution. Think of bits that might get listeners interested.
b) Develop the materials into separate paragraphs. Write each paragraph on a separate piece of paper.
c) Structure your text. Decide on the order of each paragraph.
d) Write the text as a whole, adding introduction, conclusion and links between paragraphs.
e) Think of a "catchy" beginning and an interesting ending but be brief.
f) Proofread the material checking the spelling, punctuation, grammar and vocabulary
g) Practise to be very precise with time: rehearse it.
h) Don't forget you must speak, not read.
i) Use various visual aids (handouts, PowerPoint, photos, sound) to make your presentation interesting and captivating.
j) Be ready to answer any questions that might arise.

7 Read the text "Are the Inventions Inevitable?". Give examples of independent discoveries in your field of study.

It is an interesting phenomenon that many inventions have been made two or more times by different inventors, each working without knowledge of the other's research. There are a number of cases of such duplicate inventions or discoveries that are of common knowledge. It is well known, for instance, that both Newton and Leibnitz invented calculus. The theory of natural selection was developed

practically identically by Wallace and by Darwin. It is claimed that both Langley and Wright invented the airplane. And we all know that the telephone was invented by Gray and by Bell. A good many such cases of duplication in discovery are part of the stock of knowledge of the general reader.

There are, however, a large number of very important instances that are not so well known. For example, the invention of decimal fraction is credited to Rudolph, Stevinus and Burgi. Oxygen was discovered by Scheele and by Priestley in 1774. The molecular theory is due to Avagadro in 1811 and to Ampere in 1814. Both Gros and du Hauron invented colour photography in 1869. The trolley car resulted from the work of van Doeple and also Strague, and the essential elements were devised independently by Siemens and Daft.

We think of Napier and Briggs as the inventors of logarithms, but it is not generally known that Burgi also invented them three years previously. We associate the origin of photography with Daguerre but it was also independently invented by Talbot. Boyle's Law is known in French textbooks as Marriotte's Law. The existence of Neptune was discovered independently by Adams and Leverrier, before the planet was actually observed, the work of these two mathematical astronomers leading to its observation by others. Gauss is frequently recognized as responsible for the principle of least squares. Legendre published his account of the principle three years before Gauss did, although Gauss had used his principle still earlier.

Are Inventions Inevitable? A Note on Social Evolution
William F. Ogburn, Dorothy Thomas

8 Do you agree with the Plato's words – Necessity is the mother of invention. Why?/Why not?

Extra Credit Projects

1 Design an advertisement for an invention, your own or an existing product.
2 Draw a collage illustrating the development of an invention or discovery and

its effects on people, places or things.

3 Create an invention that doesn't currently exist that could change our lives forever! Draw and label your invention and explain how it might affect our lives.

4 Read an original source describing an invention or discovery. For example, read a selection from Edison's journal or DaVinci's notebook or an original patent for an invention. Tell where you found your information and write a summary. Include quotes from the original source.

5 Write and illustrate an alphabet book of important inventions or discoveries (in your field of study) and their significance.

6 Imagine you are a person living at the time of a key invention or discovery. Write a journal of your thoughts and impressions. Try to relate them to your personal life. You could be the person responsible for the invention or someone affected by it. For example, you could be Thomas Edison or a person living without electricity.

7 Create a scrapbook of mementos and artifacts which illustrate inventions and discoveries from a specific period of time. (encyclopedia entries, newspaper/magazine articles, pictures, videos, audio files, photographs, maps, stories, etc)

Use the hyperlink – Filamentality: Start a new page to create your scrapbook http://www.kn.pacbell.com/wired/fil/lognew.html

Tools & Software

- ✓ ***Hypertext Webster Dictionary*** lets you quickly get definitions to words. See if you can bookmark this as a favorite site so you can get to it easily. http://humanities.uchicago.edu/orgs/ARTFL/forms_unrest/webster.form.html
- ✓ ***Roget's Internet Thesaurus*** allows you to find words that have similar meanings http://www.virtualref.com/abs/36.htm
- ✓ ***Lview Pro (Windows)*** lets you show pictures you get from the Web http://www.lview.com/

- ✓ ***HyperStudio*** is used at many schools. Check out the Website for support, ideas, and the Netscape Plug-In (requires Mac & Netscape 2.0) http://www.mackiev.com/hyperstudio/index.html
- ✓ ***Shareware.com*** gives you access to thousands of software programs you may want to use to show off your scrapbooks. http://www.shareware.com/
- ✓ Of course you could use an HTML editor or presentation software (like Microsoft PowerPoint) to create a Web page of your scrapbook.

General Requirements:

- You may work alone or with one other person.
- You must cite at least 3-4 sources used for research and provide links/reference for these sources
- If your project is not a written report, please write a brief description.
- If your project an Internet-based, please provide a MS Word-based copy (hard or electronic)
- Your project should be of presentation quality, ready to display in the halls, library or computer class.
- Points will be assigned by your teacher based on depth of research and quality of presentation.

Keys

Module 1 Bar Code Reader

Vocabulary 1

a) merchandise	b) request	c) would glow
d) device	e) was convinced	f) earnings
g) noted	h) application	i) was issued
j) was recognized	k) recommended	l) was abandoned
m) adopted	n)	o)

Vocabulary 2

1e 2a 3h 4i 5c 6b 7d 8g 9f

Vocabulary 4

EPOS – electronic point of sale

RCA – Radio Corporation of America

UPC – universal product code, универсальный товарный код (УТК),

NCR – National Cash Register компания

IBM – International Business Machines компания

Vocabulary 5

Electronic payments:

cash / outlets / central / goods / touch / receipts / funds / debit

Vocabulary 6

1 f 2 c 3 b 4 h 5 a 6 d 7 e 8 g

Vocabulary 7

checkout counter, punch card, customer, a checker, a graduate student, instability, articles, to commercialize

Grammar 1

The bar code is converted into electrical pulses (by the scanner).

The price and description of the product are sent from the branch computer to the EPOS till where the barcode is read (by the scanner).

The sale of the product is recorded by the branch computer.

The items and price are shown by the till.

The item is scanned by the checkout operator.

The pulses are sent from the scanner to the branch of computer.

The item and price are printed by the till on the paper receipt.

The stock file for a product matching the barcode EAN are searched/looked for by the branch computer.

Progress test

1c 2) b 3) c 4) b 5) c 6) c 7)

Module 2 Photocopier

Vocabulary 1

1) e 2) a 3)d 4) g 5)j 6) b 7)c 8) f 9) k 10) h 11)i

Vocabulary 3

a) eliminate b) employee c) lay off d) implementing e) increase
f) image g) area h) specified i) turned away j) replaced
k) duplex l) permanent

Vocabulary 4

a) behind b) for c) of d) - e) to f) of g) via h) for i) -

Vocabulary 6

innovative, driving force, tedious task, automated option, to make ends meet, grow

weary, make the hand copies, come to the conclusion, implement the idea, findings, deduce, electric current, revenue, release, sell in the thousands, bring into reality, replace, duplex printing, integrated, build jobs, insightful entrepreneur, donate to charity.

Progress test

1c 2a 3c 4b 5a 6b 7c

Module 3 Microscope

Vocabulary 1

Encode, extracode, miscode; encourage, discourage; encage, uncage; enforce; rebalance, unbalance, disbalance; enjoy; extraction, reaction; extracopy, recopy; misadjust, disadjust; disagree; recount, miscount, discount; reappear, disappear; reappoint, disappoint; enclose, reclose, unclose, disclose; research; unload, reload; mischief; unplug, misplug; mistype, retype

Vocabulary 3

a) to discover, discovery, discovered, discoverable
b) to magnify, magnification, magnifying, magnificently
c) to remark, remark, remarkable, remarkably
d) to focus, focus, focusable/focused, ----------
e) to enable, enable, enabling, enabled
f) to observe, observation, observable, observably
g) to vacuumize, vacuum, vacuumized
h) to visualize vision, visual, visually
i) to print, print, print, printable; printability

Vocabulary 4

Noun - focus, glasses, life

Verb - magnify, observe

Both - grind, shape, seed

Vocabulary 5

a) occurred
b) discovered
c) are shaped
d) larger
e) complex
f) apprentice
g) existence
h) copy
i) optical
j) to distinguish
k) will be invisible
l) are speeded up

Vocabulary 6 a

1) eyepiece	2) revolving nose piece	3) body tube	4) draw tube	5) object lens
6) stage	7) condenser	8) substage	9) mirror	10) base

Vocabulary 7

Fill the bill, fast-moving electron, to speed up in a vacuum, ….fine optical equipment, lens, magnifier; findings; to design; focusing device, to set fire to a piece of parchment or cloth, the existence of tiny living organisms in a drop of water, to be dubbed.

Grammar 1

Singular	**Plural**
Compass, lens, Physics, means, knowledge, water, information, equipment, blood, advice	Glasses, corpuscles, findings, diameters, capillaries, spectacles, rays, clothes, fleas, goods, contributions,

Grammar 2

Positive	**Comparative**	**Superlative**
remarkable	more/less remarkable	the most/least remarkable
early	earlier	the earliest
little	less	the least
extraordinary	more/less extraordinary	the most/least the most/least
large	larger	the largest

Speaking 2a

A microscope is “an instrument ***consisting*** essentially of a lens ***or*** a combination of lenses***, for*** making very small objects, ***such*** as microorganisms, look larger ***so*** that they can be ***seen*** and studied."

Speaking 2b

An electron microscope is **an** instrument for focusing rays ***and constitution of any*** electrons, rather than light ***rays*** to form an enlarged ***image*** of the object: it ***is also*** much more powerful ***than*** any optical microscope.

Progress test

1)a 2)b 3)b 4)c 5c 6a 7c

Module 4 Compact Disk

Vocabulary 1

1) g 2) c 3)e 4) h 5) f 6) d 7) b 8)a

Vocabulary 2

a) a prize b) a sentence c) one's word d) opinion

Vocabulary 3

a) realize b) unsatisfied, frustrated c) invested d) exhibited
e) imitated f) envisioned

Vocabulary 4

a) - b) out, with c) with d) in e) into f) by

Grammar 1

a) could/would read b) put/will fall fit/won't c) could/would be able d) will be/find

Grammar 2

1)c 2) d 3) a 4) b

Progress Test

1c 2a 3c 4a 5c 6a 7c

Module 5 Robots

Reading 4

1) c 2) a 3) b 4) c

Vocabulary 1

1) f 2) g 3) h 4) a 5) b 6) c 7) e 8) d

Vocabulary 2

perfect: the production of power (v)

position: both the work and the machine (v)

nickname: the Unimate (v)

extract: die-castings (v)

process: information (v)

function: as if they have brains (v)

market: a robot (v)

Vocabulary 6

programmable machine, inanimate creation, metallic helper, mechanical man, automatic machine, fabricated worker, metallic humanoid mechanism.

Vocabulary 7

precise definition, programmable machine, intelligent creature, perfect power production, proliferation of machinery, position the place, perform repetitive tasks, integrated circuit, make an effort, install, resemble, automation on a large scale, process information, function, get smarter

Grammar

Verbal noun: bidding, meeting, writings, welding

Adjective: (cycle)-repeating, (self)-measuring, adjusting, (colour)-blending, (self)-programming, manufacturing, working, die-casting, nursing

Participle I: meaning, resembling, delivering

Continuous verb form: painting, assembling, walking, driving, defusing, discussing, marketing, rolling, working.

Gerund: performing

Module 6 Follow up Activities

Task 1

1, 2 calculator	3, 5, 9 typewriter	4 photocopier
6, 11 analytical engine	7 remote control	8 Bell's telephone
9 microscope		

Task 2

1)d	2)c	3)a	4)h	5)i	6)e	7)g	8)b	9)f

Word list

Module 1 Bar Code Reader

a 1D bar code
to be coded
to be commercialized
to be updated
a bill
a checker
a checkout counter
a classification of articles
a customer
a food chain
inventory records
an item
a label
to merchandise
an optical bar code
to print patterns
to produce
a product
a punched card
a scanning system
a storeroom
a straight line pattern
ultraviolet light

Module 2 Photocopier

an analog/digital technology
automated
an automatic digital collation
a colour copier/printing
conductivity
a drum-based process
a duplex printing
efficient
an electrostatic printing
a file server
high-speed
an image
inkjet
photoconductivity
a photocopier
a project
to project
to release
a staple output
a surface
a print area
a transfer film technology
xerography

Module 3 Microscope

a beam
a compound microscope
curvature
to distinguish
an electron-sensitive photographic plate
a fast-moving electron

1. fine optical equipment
2. a focusing device
3. grinding and polishing
4. illumination
5. invisible
6. a magnifier
7. magnifying glasses
8. a micrometer
9. a particle
10. spectacles
11. to speed up
12. a tiny lens
13. a transparent crystal
14. a tube with a plate
15. a wavelength of light

Module 4 Compact Disk

1. audiophile
2. an avenue of research
3. to be commonplace
4. a binary code
5. to convert data into
6. data recording
7. digital-to-optical recording
8. envision
9. to envision
10. an experimental improvement
11. inspiration
12. to inspire
13. to initiate
14. a photosensitive platter
15. a playback system
16. a playing length
17. a record
18. to record
19. to sketch out
20. to store information

Module 5 Robots

1. an adjusting machine
2. artificial intelligent
3. automation
4. a cycle-repeating machine
5. a distinct feature
6. to function as
7. to imitate actions
8. an integrated circuit
9. to join the assembly line
10. to make an effort
11. a manufacturing company
12. to perceive conditions
13. to perform tasks
14. to position the work
15. a programmable machine
16. repetitive tasks
17. to resemble
18. a self-measuring machine
19. a self-programming machine
20. a sensory system
21. to think efficiently

Resources

Module 1 Bar Code Reader

1 http://www.infoplease.com/ce6/sci/A0806167.html

2 http://inventors.about.com/library/inventors/blbar_code.htm

3 http://inventors.about.com/gi/dynamic/offsite.htm?site=http://www.adams1.com/pub/russadam/history.html

Module 2 Photocopier

4 http://news.thomasnet.com/IMT/archives/2001/04/chesters_dream.html

5 http://www.infoplease.com/ce6/sci/A0852884.html

Module 3 Microscope

6 http://www.historyworld.net/wrldhis/PlainTextHistories.asp?groupid=1457&HistoryID=ab23

7 http://inventors.about.com/od/mstartinventions/a/microscope.htm

8 http://inventors.about.com/library/inventors/blroberthooke.htm

Module 4 Compact Disk

9 http://inventors.about.com/gi/dynamic/offsite.htm?zi=1/XJ&sdn=inventors&cdn=money&tm=23&f=11&tt=2&bt=1&bts=1&zu=http%3A//web.mit.edu/invent/iow/russell.html

10 http://news.bbc.co.uk/2/hi/technology/6950845.stm

11 http://news.bbc.co.uk/2/hi/technology/6950933.stm

12 http://micro.magnet.fsu.edu/electromag/computers/compactdiscs/cd.html

Module 5 Robots

10 http://www.thetech.org/exhibits/online/robotics/universal/index.html

11 http://www.karelcapek.net/rur.htm

12 http://www.economist.com/displaystory.cfm?story_id=7001829

13 «Trust me, I'm a robot» Jun 8th 2006 by Ronald Grant

Module 6 Follow Up Activities

14 Are Inventions Inevitable? A Note on Social Evolution. William F. Ogburn, Dorothy Thomas. Political Science Quarterly, Vol. 37, No. 1 (Mar., 1922), pp. 83-98