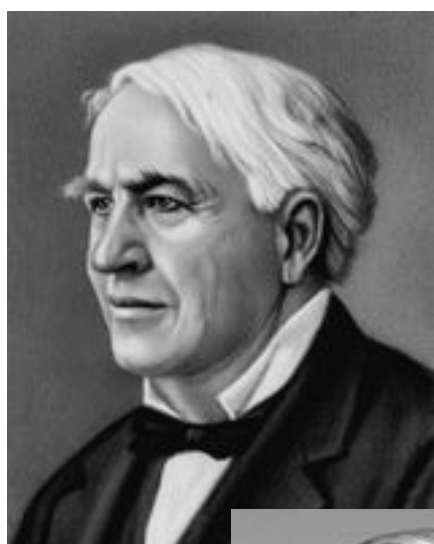


А.И. Киркин, Р.М. Москвина, Г.А. Ногтев

GREAT PEOPLE OF SCIENCE

Учебное пособие



Иваново 2006

Федеральное агентство по образованию Российской Федерации
Государственное образовательное учреждение
высшего профессионального образования
Ивановский государственный химико-технологический университет

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Great people of science: учеб. пособие для студентов 1 и 2 курсов технологических специальностей ИГХТУ/ А.И. Киркин, Р.М. Москвина, Г.А. Ногтев; под ред. Н.К. Ивановой; ГОУВПО Иван. гос. хим.-технол. ун-т. Иваново, 2006, 84с. ISBN 5-9616-0163-3

Учебное пособие “Great People of Science” предназначено для студентов I и II курса технологических специальностей ИГХТУ, а также можно рекомендовать для самостоятельной работы в группах аспирантов и преподавателей.

Данное учебное пособие с аудиоприложением имеет целью развитие навыка восприятия на слух и понимания иностранной речи, совершенствование умений самостоятельно читать оригинальную литературу, быстро извлекать из нее необходимую информацию.

Пособие включает оригинальные тексты, которые содержат информацию о деятельности и биографических данных выдающихся деятелей науки и техники. Для эффективного усвоения языкового материала предусмотрены различные упражнения, стимулирующие мыслительную деятельность обучаемых и позволяющие развивать творческое отношение к изучаемому материалу, выражать свое мнения по прочитанному, логически обосновывать свою точку зрения. Многие тексты имеют большой образовательный и воспитательный потенциал, помогают студентам расширить кругозор.

Ил. 20.

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От составителя

Настоящее учебное пособие предназначено для студентов I и II курса технологических специальностей ИГХТУ. Его можно рекомендовать для использования при самостоятельной работе студентов.

В основе пособия лежит идея взаимосвязанного и одновременного развития группы речевых навыков и умения аудирования, чтения и говорения. Пособие состоит из 10 основных уроков (5 для изучения в I семестре и 5 для изучения во II семестре). Урок, являясь структурной единицей пособия, представляет собой совокупность трех текстов (А,В,С) и системы упражнений. Тексты взяты из оригинальной научно-популярной литературы и имеют аудиоприложение.

Основной текст (текст А) содержит новый материал для чтения и понимания, который вводится на стадии предтекстовой подготовки. При первом чтении текст произносит диктор – носитель языка. Цель этого приема – заинтересовать учащегося, направить его внимание на активное, заинтересованное восприятие нового лексического материала. При втором чтении студенты вслед за диктором проговаривают в паузах текст, что позволяет им, благодаря артикуляционно-моторной памяти, легче запоминать и воспроизводить фразы программы. Во время третьего чтения преподаватель вначале читает русский текст, а после паузы – диктор читает иностранный. Студентам дается установка проговаривать в паузах, которые следуют за русским текстом, фразы на иностранном языке, предвосхищая диктора. Учащиеся, как правило, успевают проговаривать про себя соответствующую фразу или часть ее на иностранном языке.

Тексты В и С содержат отработанный ранее лексический и грамматический материал. На базе этих текстов отрабатываются опознание и восприятие пройденного материала и развиваются навыки различных видов чтения.

Такой эффект запоминания убеждает студентов, что материал усвоен, вселяет в них уверенность, спокойствие, что, в свою очередь способствует лучшему запоминанию и осмыслению учебного материала.

Предтекстовые упражнения, как правило, выполняются в аудитории. Цель предтекстовой работы – восстановление материала, пройденного ранее, развитие языковой догадки, формирование умений анализировать лексические и грамматические формы. Упражнения на перевод имеют целью научить наблюдательности, умению делать выводы и обобщение. Учащийся добьется лучших результатов, если он будет переводить английские предложения на русский, а затем восстанавливать английское предложение на основе русского перевода.

Все упражнения урока делятся на предтекстовые и послетекстовые. Послетекстовые упражнения (Assignments) нацелены на глубокое проникновение в смысл текста и подводят студента к творческой работе с текстовым материалом – выделение основной мысли отрывка, разбивка текста на смысловые части и пр.

Учебный и иллюстративный материал для пособия взят из Encyclopedia Britannica Children's Edition 2005, Encyclopedia Britannica 2004, Ready Reference 2004, English Platinum 1999 и БСЭ 2004, а также из Интернет-ресурсов.

UNIT 1

PRETEXT EXERCISES

1. Practice in pronunciation:

Thomas Edison /'tɒməs 'edɪsn/, research /rɪ'sɜ:tʃ/, realize /'rɪəlaɪz/, deaf /def/, taught /tɔ:t/, laboratory /lə'bɒrətəri/, productive /prə'dʌktɪv/, projector /prə'dʒektə/, incandescent /,ɪnkæ'nɪdesnt/, bulblight /'bʌlblaɪt/, ordinary /'ɔ:dnri/, phonograph /'fəʊnəgrɑ:f/.

2. Pay attention to the pronunciation of the verb endings:

/d / lived, expelled, realized.

/t / worked, researched, learnt, built.

/ɪd / started, projected, invented, included, patented.

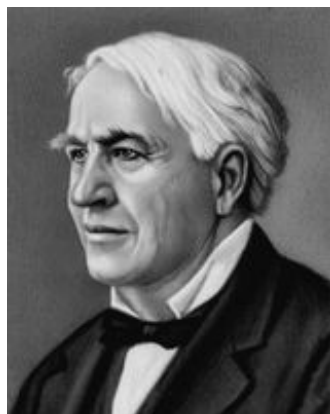
3. Read and translate the following international words:

laboratory /lə'bɒrətəri/, industrial /ɪn'dʌstriəl/, patent /'peɪtənt/, projector /prə'dʒektə/, start /stɑ:t/, lamp /læmp/, productive /prə'dʌktɪv/, phonograph /'fəʊnəgrɑ:f/, realize /'rɪəlaɪz/, ordinary /'ɔ:dnri/.

Listening and reading for information:

Text A

THOMAS EDISON (1847 – 1931) /'tɒməs 'edɪsn /



The American inventor Thomas Edison lived and worked in the United States all his life. He was the most productive inventor ever. During his lifetime, he patented 1,093 different inventions, including the incandescent electric lamp (similar to the ordinary light bulb we know today), the motion-picture projector, and the phonograph.

He also set up the first industrial research laboratory.

Edison had a slow start in life. He was expelled from school because people did not realize that he was deaf, thinking instead that he was unable to learn. His mother taught him at home, where he had built his own laboratory by the time he was 10 years old.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Who is the text about?

Did Thomas Edison live in the United States of America or in Great Britain?

Thomas Edison was the most productive inventor, was not he?

Did he patent more than 1,000 different inventions during his life-time?

Will you name some of his inventions?

Why was he expelled from school?

How did Thomas Edison get his education?

2. State whether these sentences are true or false using the following clichés:

As far as I know

Well, it seems ...

I suppose

To start with ...

I mean

I think ...

I must confess

I suggest ...

I must disappoint you

I believe ...

The thing is

In fact ...

I hope

If I'm not mistaken ...

Actually

Frankly speaking ...

I guess

The fact is ...

In my opinion

I'm afraid ...

They say

To tell the truth ...

Unfortunately

Most likely ...

Thomas Edison had a fast start in his life.

Edison got his education in Oxford university.

Thomas Edison lived and worked in the United Kingdom.

Edison was expelled from school due to his bad behaviour.

He built his first laboratory at the age of twenty.

The great American inventor was engaged in solving theoretical problems of mechanics.

3. Remember the derivatives of the words:

pro'duce – pro'ducer – pro'duction – pro'ductive – ,produc'tivity

in'vent – in'ventor – in'vention - in'ventive

'differ – 'difference – 'different

build – 'builder – 'building

4. Find the corresponding English equivalents to the Russian expressions:

за свою жизнь, запатентовать изобретение, самый плодотворный изобретатель, исключать из школы, неспособный к учебе, обучать дома, построить лабораторию.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find Participle I and Participle II in the sentences and state their functions.

C. Give the initial forms of the following words:

inventor, productive, different, projector, industrial, thinking, electric, including, taught, unable, built, was, set up, invention, difference, expelled, electricity.

6. Fill in the blanks with the propositions where necessary:

...his life, he patented 1,093 different inventions.

His mother taught him ... home.

He was expelled... school.

Thomas Edison had a slow start ... his life.

He set ... the first industrial research laboratory.

People didn't realize that he was deaf, thinking ... that he was unable to learn.

He had built his own laboratory ... the time he was ten.

7. Put the words in the correct word order:

was, ever most, the, he, productive, inventor.

life, had, a, slow, in, start, Edison.

mother, at, him, home, taught, his.

8. Complete the sentences:

During his lifetime, he patented 1.093 different inventions, including

His mother taught him

He was expelled

He invented the incandescent electric lamp similar to

9. Look for some additional information about Thomas Edison in Internet, encyclopedia, reference books and other sources.

Text B

NICOLA TESLA (1856 – 1943) /'nikələ 'tesl{/



The Croatian – born American inventor Nicola Tesla patented an electricity-generating and distribution system that transmitted alternating current (AC). He developed and applied many other important ideas in the fields of electricity and radio. The Tesla coil, an induction coil he invented, is used in radio technology and operates at every high frequencies. Tesla worked briefly for the American inventor Thomas Edison (1847-1931), but they fell out

because they disagreed about the best form of electric current to use for large-scale supply. In the end, Tesla's alternating current system was favored over Edison's direct current (DC) system.

1. Get acquainted with the technical terminology in the field of electricity:

generate, electricity, distribution system, transmit, current, alternating current AC, direct current DC, apply, application, induction coil, high frequency, low frequency.

2. Look the texts through and say what is in common in the research of Thomas Edison and Nicola Tesla.

3. Look over the texts A and B again and answer ...

What is the main idea of the texts ?

What are the details?

What conclusions can be drawn?

What is the purpose of the author of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Nikola Tesla”

The brilliant inventor and electrical engineer Nikola Tesla developed the alternating current (AC) power system that provides electricity for homes and buildings. Tesla was granted more than 100 United States patents. Many of his discoveries led to electronic developments for which other scientists were honored.

Nikola Tesla was born in Smiljan, Croatia, then part of Austria-Hungary, on July 9 or 10, 1856. He was often sick during his boyhood, but he was a bright student with a photographic memory. Against his father's wishes he chose a career in electrical engineering. After his graduation from the University of Prague in 1880, Tesla worked as a telephone engineer in Budapest, Hungary. By 1882 he had devised an AC power system to replace the weak direct-current (DC) generators and motors then in use.

Tesla moved to the United States in 1884. Thomas Edison hired the young engineer as an assistant upon his arrival. Friction soon developed between the two, and by 1886 Tesla had lost his job. In 1887 he received enough money from backers to build a laboratory of his own in New York City.

Tesla became a United States citizen in 1889. A year earlier he had received a patent for his AC power system. At the heart of this system was the efficient polyphase induction motor that he developed. George Westinghouse bought the patent rights from Tesla. Westinghouse then launched the campaign that established alternating current as the prime electrical power supply in the United States.

Tesla later invented a high-frequency transformer, called the Tesla coil, which made AC power transmission practical. He also experimented with radio and designed an electronic tube for use as the detector in a voice radio system almost 20 years before Lee De Forest developed a similar device. Tesla lectured before large audiences of scientists in the United States and Europe between the years 1891 and 1893.

Although Tesla had laid the theoretical basis for radio communication as early as 1892, Guglielmo Marconi claimed all basic radio patents because of his own pioneering work in the field. In 1915 Tesla made an unsuccessful attempt to obtain a court injunction against the claims of Marconi. When the United States Supreme Court reviewed this decision in 1943, however, it reversed the decision

and invalidated Marconi's patents on the ground that they had indeed been anticipated by earlier work.

Tesla and Edison supposedly had been chosen to share a Nobel prize in physics. According to the report, Tesla declined his share of the award because of his doubt that Edison was a scientist in the strictest sense. Neither of them ever received the prize.

During his later years he led a secluded, eccentric, and often destitute life, nearly forgotten by the world he believed would someday honor him. Tesla died on Jan. 7, 1943, in New York City. The Tesla Museum in Belgrade, Serbia and Montenegro, was dedicated to the inventor. In 1956 the tesla, a unit of magnetic flux density in the metric system, was named in his honor.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Thomas Edison”

born Feb. 11, 1847, Milan, Ohio, U.S.

died Oct. 18, 1931, West Orange, N.J.

U.S. inventor.

He had very little formal schooling. He set up a laboratory in his father's basement at age 10; at 12 he was earning money selling newspapers and candy on trains. He worked as a telegrapher (1862–68) before deciding to pursue invention and entrepreneurship. Throughout much of his career, he was strongly motivated by efforts to overcome his handicap of partial deafness. For Western Union he developed a machine capable of sending four telegraph messages down one wire, only to sell the invention to Western Union's rival, Jay Gould,

for more than \$100,000. He created the world's first industrial-research laboratory, in Menlo Park, N.J. There he invented the carbon-button transmitter (1877), still used in telephone speakers and microphones today; the phonograph (1877); and the incandescent lightbulb (1879). To develop the lightbulb, he was advanced \$30,000 by such financiers as J.P.Morgan and the Vanderbilts. In 1882 he supervised the installation of the world's first permanent commercial central power system, in lower Manhattan. After the death of his first wife (1884), he built a new laboratory in West Orange, N.J. Its first major endeavour was the commercialization of the phonograph, which Alexander Graham Bell had improved on since Edison's initial invention. At the new laboratory Edison and his team also developed an early movie camera and an instrument for viewing moving pictures; they also developed the alkaline storage battery. Although his later projects were not as successful as his earlier ones, Edison continued to work even in his 80s. Singly or jointly, he held a world-record 1,093 patents, nearly 400 of them for electric light and power. He always invented for necessity, with the object of devising something new that he could manufacture. More than any other, he laid the basis for the technological revolution of the modern electric world.

UNIT 2

PRETEXT EXERCISES

1. Practice in pronunciation:

Benjamin /'benzəmɪn/, Heinrich Hertz /'haɪnrɪk 'hɜːts/, patriot /'peɪtriət/, however /haʊ'evə/, notable /'nəʊtəbl/, experiment /ɪks'perɪmənt/, lightning /'laɪtnɪŋ/, scientist /'saɪəntɪst/, stove /stəʊv/, energy /'enədʒɪ/, static /'stætɪk/, flying /'flaɪŋ/, attach /ə'tætʃ/, use /juːs/, n., /juːz/, v., term /tɜːm/.

2. Pay attention to the pronunciation of the verb endings:

/d/ carried, remembered, showed, used.

/t/ worked, established, introduced, attached, jumped.

/ɪd / invented, experimented.

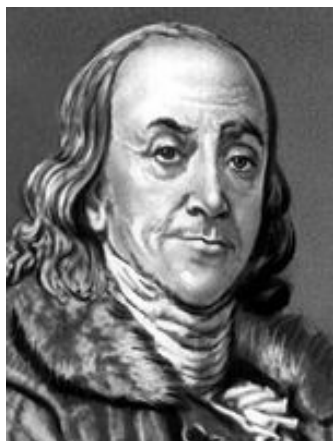
3. Read and translate the following international words:

patriot /'peɪtriət/, experiment /ɪks'perɪmənt/, electricity /ɪlek'trɪsəti/, introduction /ɪntrə'dʌkʃn/, term /tɜːm/, positive /'pɒzɪtɪv/, negative /'negətɪv/, form /fɔːm/, energy /'enədʒɪ/, metal /'metl/.

Listening and reading for information:

Text A

BENJAMIN FRANKLIN (1706 – 1790) /'bendʒəmɪn 'fræŋklɪn/



Many people remember Benjamin Franklin as a writer, statesman, and patriot who did much to establish the United States of America. Franklin, however, was also a notable scientist who carried out important experiments in electricity, and the inventor of the lightning rod and a stove that is still in use today. He also introduced the use of the electrical terms "positive" and "negative". In his

most famous experiment, Franklin showed that lightning was the same form of energy as static electricity. He did this by flying a kite in a thunderstorm. He put his finger near a key attached to the metal kite string, and a spark jumped between them.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

What was Benjamin Franklin?

What field did Benjamin Franklin carry out his experiments in?

What did he invent?

What terms did he introduce?

Is lightning the form of light or static electricity?

He flew a kite in a thunderstorm, didn't he?

What was a key attached to?

What jumped between his finger and a key?

2. State whether these sentences are true or false using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say,

To tell the truth

Unfortunately

Most likely

Benjamin Franklin carried out important experiments in biology.

Benjamin Franklin invented the lightning rod and an electric lamp that is still in use today.

He was a writer, statesman and patriot who did much to establish the United Kingdom.

Benjamin Franklin introduced the use of the electric term “rotor” and “resistor”.

He put his finger near a key attached to the metal kite string and a flash jumped between them.

3. Remember the derivatives of the words:

'science – 'scientist – ,scien'tific

in'vent – in'ventor – in'vention – in'ventive

,elect'ricity – e,lect'rician – e'lectric – e'lectrical

'note – 'notice - 'notable

'state – 'statesman – 'statement

'import – im'port – im'portant – im'portance

4. Find the corresponding English equivalents to the Russian expressions:

выдающийся ученый, проводить опыты, запускать змей, прикрепленный к, искра, вводить термин, изобретать.

5. Grammar Review

A. Find irregular verbs in the text and give their three forms.

B. Find Gerund and Participle II in the text and state their functions.

C. Give the initial forms of the words:

writer, notable, carried, inventor, lightning, famous, attached, flying, did, important, introduced.

6. Fill in the blanks with the propositions where necessary:

Franklin was a notable scientist who carried ... important experiments ... electricity.

He was the inventor ... the lightning rod and a stove that is still ... use today.

He put his finger ... a key attached ... the metal kite string.

A spark jumped ... them.

7. Put the words in the correct word order:

in, experiments, Franklin, out, carried, important, electricity.

a thunderstorm, he, by, this, did, in, a kite, flying.

America, the, much, to, did, Franklin, establish, States, United.

8. Complete the sentences:

He put his finger

Many people remember

In his famous experiment,

Franklin, however, was

9. Look for some additional information about Benjamin Franklin in Internet, encyclopedia, reference books and other sources.

Text B

HEINRICH HERTZ (1857 – 1894) /'haɪnrɪk 'hɜ:ts/



The name of German physicist Heinrich Hertz has become a part of everyday language because of his work on electromagnetic waves. The hertz (Hz), the unit used to measure the frequency of electromagnetic waves, is named for the German scientist. Hertz was inspired by the work of the Scottish physicist James Clerk Maxwell

(1831-79), who had predicted the existence of electromagnetic waves. Hertz designed and built equipment that proved that these waves exist and that they could be detected at a distance. He was sure that electromagnetic waves could be used to transmit messages across the Atlantic, but he died before the use of radio showed that he was right.

1. Get acquainted with the technical terminology in the field of electricity:

waves, unit, measure, frequency, detect, transmit, positive, negative, energy, attach to, string, spark.

2. Tell about the application of electromagnetic waves discovered by the German scientist Heinrich Hertz.

3. Look through the texts once more and say what is common in the researches of Thomas Franklin and Heinrich Hertz.

4. Look over the texts again and answer:

What is the main idea of the texts?

What are the details?

What conclusions can be drawn?

What is the purpose of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Heinrich Hertz”

As the 19th century drew to a close, a number of important discoveries in the field of physics were made. One of them—the discovery of electromagnetic

radiation—was the achievement of Heinrich Hertz, a German physicist. Hertz's research paved the way for the development of radio, television, and radar.

Heinrich Rudolf Hertz was born in Hamburg, Germany, on Feb. 22, 1857. His father was a prominent lawyer and legislator. In his youth Heinrich enjoyed building instruments in the family workshop.

Hertz began his college studies at the University of Munich. After a short time he transferred to the University of Berlin, where he received his Doctor of Philosophy degree magna cum laude. In Berlin he was an assistant to Hermann von Helmholtz, one of the foremost physicists of the time. In 1883 Hertz became a lecturer in theoretical physics at the University of Kiel. Two years later he was appointed professor of physics at Karlsruhe Polytechnic. In 1886 Hertz married Elizabeth Doll, daughter of a Karlsruhe professor; they had two daughters.

In the 1880s physicists were trying to obtain experimental evidence of electromagnetic waves. Their existence had been predicted in 1873 by the mathematical equations of James Clerk Maxwell, a British scientist (see Maxwell; Radiation).

In 1887 Hertz tested Maxwell's hypothesis. He used an oscillator made of polished brass knobs, each connected to an induction coil and separated by a tiny gap over which sparks could leap. Hertz reasoned that, if Maxwell's predictions were correct, electromagnetic waves would be transmitted during each series of sparks. To confirm this, Hertz made a simple receiver of looped wire. At the ends of the loop were small knobs separated by a tiny gap. The receiver was placed several yards from the oscillator. According to theory, if electromagnetic waves were spreading from the oscillator sparks, they would induce a current in the loop that would send sparks across the gap. This occurred when Hertz turned on the oscillator, producing the first transmission and reception of electromagnetic waves.

Hertz also noted that electrical conductors reflect the waves and that they can be focused by concave reflectors. He found that nonconductors allow most of the waves to pass through. Another of his discoveries was the photoelectric effect. In 1889 Hertz was appointed professor of physics at the University of Bonn. He died in Bonn on Jan. 1, 1894.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Benjamin Franklin”

Few men have done as much for the world as Benjamin Franklin. Although he was always proud to call himself a printer, Franklin had many other talents as well. He was a diplomat, a scientist, an inventor, a philosopher, an educator, and a public servant.

Any one of Franklin's many accomplishments would have been enough to make him famous. He organized the first library in America. He invented many things, including the lightning rod. Franklin amazed scientists throughout the world with his experiments in electricity.

In Europe, Benjamin Franklin was the most famous American of his time. It was he who persuaded the English to repeal the hated Stamp Act¹. It was also he who convinced the French to aid in the American Revolution. Franklin helped draft both the Declaration of Independence and the United States Constitution.

¹ Stamp Act – a stamp tax imposed upon the American colonies by the British Parliament as a tax on all printed matter in 1765.

UNIT 3

PRETEXT EXERCISES

1. Practice in pronunciation:

Austrian /'ɒstriən/, Lise Meitner /'li:zə 'maɪtnə/, nuclear /'nju:kliə/, expert /'ekspɜ:t/, atomic /ə'tɒmɪk/, despite /dɪ'spaɪt/, racial /'reɪʃl/, jewish /'dʒu:ɪʃ/, sexual /'seksʊəl/, neutral /'nju:trəl/, Sweden /'swi:dn/, actually /'æktʃʊəli/, physicist /'fɪzɪsɪst/, theory /'θɪəri/, produce /prə'dju:s/.

2. Pay attention to the pronunciation of the verb endings:

/d/ remembered, studied, named, used, discovered, despised, bombed.

/t/ produced, distanced, worked.

/d/ discriminated.

3. Read and translate the following international words:

physics /'fɪzɪks/, radioactivity /,reɪdɪəʊæk'tɪvəti/, expert /'ekspɜ:t/, theory /'θɪəri/, production /prə'dʌkʃn/, racial /'reɪʃl/, sexual /'seksʊəl/, discrimination /dɪ'skrɪmɪ'neɪʃn/, neutral /'nju:trəl/, chance /tʃɑ:ns/, data /'deɪtə/, atom /'ætəm/, bomb /bɒm/, distance /'dɪstəns/.

Listening and reading for information:

Text A

LISE MEITNER (1878 – 1968) /'li:zə 'maɪtnə/



The Austrian nuclear physicist Lise Meitner is remembered for her discovery of the radioactive element protactinium. She studied radioactivity with experts in atomic theory and produced important work, despite having to overcome both racial (she was Jewish) and sexual discrimination. In 1938 she fled Nazi Germany

and went to neutral Sweden. This gave her the chance to work on her theory of nuclear fission (as she named it), using data from German scientists that described how they had actually split an atom. Meitner distanced herself from the first use of the theory - the production of an atomic bomb.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

What element did Lise Meitner discover?

Whom did she study radioactivity with?

She had to overcome both racial and sexual discrimination, didn't she?

Did Lise Meitner go to the United States of America or Sweden in 1938?

What theory did she work on?

Did Lise Meitner use data from German or American scientists?

Who actually split an atom?

Lise Meitner distanced herself from the production of an atomic bomb, didn't she?

2. State whether these sentences are right or wrong using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say

To tell the truth

Unfortunately

Most likely

Lise Meitner is remembered for her discovery of the element hydrogen.

She had to overcome both racial and sexual discrimination.

In 1938 she fled Germany and went to the Soviet Union.

She used data from American scientists who had actually split an atom.

Lise Meitner studied electromagnetic waves in the field of electricity.

3. Remember the derivatives of the following words:

'nucleus – 'nuclei – 'nuclear

'physics – 'physicist – 'physical

ˌradioac'tivity – ˌradio;active - ˌradi'ation

di'scriminate – di,scrimi'nation – di'scriminative

pro'duce – pro'duction – ˌproduc'tivity – pro'ductive

'theory – theo'retical – 'theorize

'atom – a'tomic – 'atomize

'neutralize – 'neutral – neu'trality

4. Find the corresponding English equivalents to the Russian expressions:

преодолевать дискриминацию, покидать страну, предоставлять возможность, использовать данные, расщеплять атом, ядерный синтез, процесс расщепления ядра.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find in the text sentences containing Passive Voice, Infinitive and Participle I.

C. Give the initial forms of the following words:

discovery, radioactive, atomic, discrimination, production, described, having, using, actually.

6. Fill in the blanks with the propositions where necessary:

....1938 she fled Nazi Germany and went neutral Sweden.

She used data German scientists.

Lise Meitner distanced herself the production an atomic bomb.

This gave her the chance to work her theory nuclear fission.

She studied radioactivity experts atomic theory.

7. Put the words in the correct word order:

in, theory, she, radioactivity, experts, with, studied, atomic.

scientists, used, data, from, she, German.

Sexual, both, to, had, overcome, Meitner, and, racial, discrimination, Lise.

8. Complete the sentences:

The Austrian nuclear

This gave her

Meitner distanced herself

She studied radioactivity

9. Look for some additional information about Lise Meitner in Internet, encyclopedia, reference books and other sources.

Text B

MARIA GOEPPERT MAYER (1906 – 1972)

/mə'riə 'gɒpət 'meɪə/

The German-born American physicist Maria Goeppert Mayer is renowned for her work in nuclear physics. She studied the existing ideas about the structure

and bonding properties of an atom. She then went on to develop her own theories, which are still in use today. Goeppert Mayer emigrated from Germany to the United States in 1931, and received funds that enabled her to pursue her ideas. In 1963 Goeppert Mayer shared a Nobel Prize with two other physicists, the German Hans Jensen (1907- 73) and the American Eugene Wigner (b.1902), for their independent work on nuclear shell structures.

1. Get acquainted with the technical terminology in the field of physics:

atom, atomic, nucleus, nuclei, nuclear, structure, bond, property, physical, shell, fission, split, radioactivity.

2. Speak about the nuclear power use in peaceful purposes.

3. Look through both texts once more and say what is common in the biographies of the two famous women.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Lise Meitner”

The Austrian physicist Lise Meitner shared the Enrico Fermi award in 1966 with Otto Hahn and Fritz Strassmann for research leading to the discovery of nuclear fission. Her own primary work in physics dealt with the relation between beta and gamma rays.

Meitner was born in Vienna on Nov. 7, 1878. She studied at the University of Vienna, where she received her doctorate in physics in 1907. She

then went to Berlin to join chemist Otto Hahn in research on radioactivity. She studied with Max Planck and worked as his assistant.

In 1913 Meitner became a member of the Kaiser Wilhelm Institute in Berlin (now the Max Planck Institute). In 1917 she became head of its physics section and codirector with Otto Hahn. They worked together for about 30 years and discovered and named protactinium. They also investigated the products of neutron bombardment of uranium.

Because she was Jewish, Meitner fled Germany in 1938 to escape Nazi persecution. She went to Sweden, which remained neutral during World War II. Here, with her nephew Otto Frisch, she studied the physical characteristics of neutron-bombarded uranium and proposed the name fission for the process. Hahn and Strassmann, following the same line of research, noted that the bombardment produced much lighter elements. Later advances in the study of nuclear fission led to nuclear weapons and nuclear power. In 1960 Meitner retired to live in England. She died in Cambridge on Oct. 27, 1968.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Marie Goeppert Mayer”



The German-American physicist Maria Goeppert Mayer won the 1963 Nobel prize for physics with J. Hans Daniel Jensen and Eugene P. Wigner. They were awarded the prize for their explanation of the structure and properties of atomic nuclei.

Maria Goeppert was born in Kattowitz, Germany, on June 28, 1906. Her father was professor of pediatrics at Göttingen University.

She studied theoretical physics at the university under Max Born and earned her doctorate in 1930. In the same year, she married Joseph E. Mayer, an American chemical physicist, and they moved to the United States to teach at Johns Hopkins University.

In 1939 she began teaching at Sarah Lawrence College and at Columbia University, where she worked on the separation of uranium isotopes for the atomic bomb in the Manhattan Project. In 1945 she continued her research at the University of Chicago's Institute for Nuclear Studies and at the nearby Argonne National Laboratory. Mayer explained the great abundance and stability of nuclei that have a particular number of protons and neutrons in terms of the so-called nuclear shell theory. Her findings were published in 'Elementary Theory of Nuclear Shell Structure' (1955), coauthored by Jensen. In 1960 Mayer and her husband moved to the University of California at San Diego. She died there on Feb. 20, 1972.

UNIT 4

PRETEXT EXERCISES

1. Practice in pronunciation:

Albert Einstein /'ælbət 'aɪnstəɪn/, mathematician /ˌmæθəmə'tɪʃn/, physicist /'fɪzɪsɪst/, famous /'feɪməs/, overturn /ˌəʊvə'tɜːn/, introduce /ˌɪntrə'djuːs/, nature /'neɪtʃə/, energy /'enədʒɪ/, oppose /ə'pəʊz/, citizen /'sɪtɪzn/, ironically /aɪ'rɒnɪkəli/, eventually /ɪ'ventʃʊəli/, destructive /dɪ'strʌktɪv/, confirm /kən'fɜːm/, during /'djʊəriŋ/, death /deθ/.

2. Pay attention to the pronunciation of the verb endings:

/d/ overturned, opposed, confirmed, destroyed, proved, used, destroyed.

/t/ introduced, established, produced.

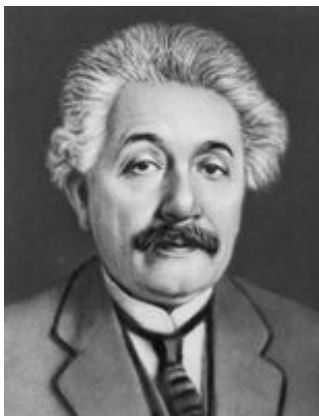
Read and translate the following international words:

mathematician /ˌmæθəmə'tɪʃn/, physicist /'fɪzɪsɪst/, history /'hɪstəri/, idea /aɪ'diə/, revolution /ˌrevə'ljuːʃn/, theory /'θiəri/, nature /'neɪtʃə/, energy /'enədʒɪ/, gravity /'grævəti/, oppose /ə'pəʊz/, ironical /aɪ'rɒnɪkl/, produce /prə'djuːs/, humanity /hjuː'mænəti/.

Listening and reading for information:

Text A

ALBERT EINSTEIN (1879 – 1955) /'ælbət 'aɪnstəɪn/



The work of German-born mathematician and physicist Albert Einstein has made him one of the most famous scientists in history. He overturned many of the long-established ideas of the English physicist Isaac Newton (1642-1727), by introducing revolutionary new theories about the nature of time, space, energy, and gravity.

Einstein became a U.S. citizen in 1940. He opposed war - but ironically his theories were eventually used to produce nuclear bombs, the most destructive weapons known to humanity. Einstein saw many of his theories confirmed during his lifetime, and others were proved after his death.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Whose ideas did Albert Einstein overturn?

Were his theories used to produce nuclear bombs?

What new theories did Einstein introduce about?

Einstein became a U.S. citizen in 1940, didn't he?

Were his theories proved or disproved after his death?

2. State whether these sentences are right or wrong using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say,

To tell the truth

Unfortunately

Most likely

Albert Einstein introduced new revolutionary theories about the nature of time, space, energy and gravity.

His theories were proved after his death.

Einstein overturned many of the ideas of the Danish scientist Niels Bohr.

His theories were used to produce nuclear bombs.

3. Remember the derivatives of the words:

'physicist – 'physics – 'physical

'history – his'torical – his'torian

ˌrevo'lution – re'volt – ˌrevo'lutionary

o'ppose – ˌoppo'sition – ˌoppo'sitionist

'nuclear – 'nucleus – 'nuclei

de'stroy – de'struction – de'structive

con'firm – ˌcon'firmation – ˌcon'firmative

4. Find the corresponding English equivalents to the Russian expressions:

перевернуть представление, вводить теорию, противостоять войне, разрабатывать ядерное оружие, разрушительное оружие, подтверждать теорию, доказывать.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find in the text the sentences with Passive Voice and Participle II.

C. Give the initial forms of the following words:

has, made, established, introducing, destructive, known, famous, theories, saw, were.

6. Fill in the blanks with the propositions where necessary:

Albert Einstein introduced new revolutionary theories ... the nature time, space, energy, and gravity.

His theories were confirmed ... his lifetime, and others were proved ... his death.

His theories were eventually used to produce nuclear bombs, the most destructive weapon known ... humanity.

7. Put the words in the correct word order:

overturned, he, Isaac Newton, ideas, of, the, many, of, long-established, English, the, physicist.

bombs, to, were, used, eventually, theories, his, produce, nuclear.

Theories, death, were, his, proved, his, after.

8. Complete the sentences:

He overturned many.....

The work of

Einstein saw

Einstein became

He opposed

9. Look for some additional information about Albert Einstein in Internet, encyclopedia, reference books and other sources.

Text B

NIELS BOHR (1885 – 1962) /'ni:ls 'bɔ:/'



Danish physicist Niels Bohr became famous for creating a new way of picturing the structure of the atom that led to the birth of modern nuclear physics. He studied in London, England, with two English physicists, Ernest Rutherford (1871-1937) and J.J. Thomson (1856-1940),

applying quantum theory to Rutherford's ideas about the structure of the atom. This resulted in the "Rutherford-Bohr atom." Back in Copenhagen in 1916, Bohr discovered the principle used to build nuclear weapons. In 1943 he fled German-occupied Denmark for the United States, where he advised on the development of the atomic bomb. He later campaigned for arms control.

1. Get acquainted with the technical terminology in the field of physics:

nuclear, quantum, structure, gravity, space, energy.

2. Speak about the role Albert Einstein and Niels Bohr played in building nuclear bomb.

3. Look through the texts once more and say what is common in the theories of Albert Einstein and Niels Bohr.

4. Look over the texts again and answer ...

What is the main idea of the texts?

What are the details?

What conclusions can be drawn?

What is the purpose of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Albert Einstein”

Any list of the greatest thinkers in history will contain the name of the brilliant physicist Albert Einstein. His theories of relativity led to entirely new ways of thinking about time, space, matter, energy, and gravity.

Einstein's work led to such scientific advances as the control of atomic energy and to some of the investigations of space currently being made by astrophysicists.

Einstein was born in Ulm, Germany, on March 14, 1879, of Jewish parents. He was a shy and curious child. He attended a rigorous Munich elementary school where he showed an interest in science and mathematics but did poorly in other areas of study. He finished high school and technical college in Switzerland. At age 22 he became a Swiss citizen. In 1903 he married Mileva Mareć. They had two sons but were later divorced. He married his widowed cousin Elsa in 1919.

In 1902 Einstein became an examiner in the Swiss patent office at Bern. In 1905, at age 26, he published five major research papers in an important German physics journal. He received a doctorate for the first paper. Publication of the next four papers forever changed mankind's view of the universe. The first one provided a theory explaining Brownian movement, the zigzag motion of microscopic particles in suspension. Einstein suggested that the movement was caused by the random motion of molecules of the suspension medium as they bounced against the suspended particles.

A second paper laid the foundation for the photon, or quantum, theory of light. In it he proposed that light is composed of separate packets of energy, called quanta or photons, that have some of the properties of particles and some of the properties of waves. The paper redefined the theory of light. It also explained the photoelectric effect, the emission of electrons from some solids when they are struck by light. Television and other inventions are practical applications of Einstein's discoveries.

A third paper, which had its beginnings in an essay he wrote at age 16, contained the "special theory of relativity." Einstein showed that time and motion are relative to the observer, if the speed of light is constant and natural

laws are the same everywhere in the universe. This paper introduced an entirely new concept.

The fourth paper was a mathematical addition to the special theory of relativity. Here Einstein presented his famous formula, $E=mc^2$, known as the energy-mass relation. What it says is that the energy (E) inherent in a mass (m) equals the mass multiplied by the velocity of light squared (c^2). The formula shows that a small particle of matter is the equivalent of an enormous quantity of energy. These papers established Einstein's status among the most respected physicists in Europe.

In 1916 Einstein published his general theory of relativity. In it he proposed that gravity is not a force, a previously accepted theory, but a curved field in the space-time continuum that is created by the presence of mass.

Between 1909 and 1914 Einstein taught theoretical physics in Switzerland and Germany. Worldwide fame came to him in 1919 when the Royal Society of London announced that predictions made in his general theory of relativity had been confirmed. He was awarded the Nobel prize for physics two years later; however, the prize was for his work in theoretical physics, not relativity theories, which were still considered to be controversial.

Einstein spoke out frequently against nationalism, the exalting of one nation above all others. He opposed war and violence and supported Zionism, the movement to establish a Jewish homeland in Palestine. When the Nazis came to power in Germany in 1933, they denounced his ideas, seized his property, and burned his books. That year he moved to the United States. In 1940 he became an American citizen.

Beginning in the 1920s Einstein tried to establish a mathematical relationship between electromagnetism and gravitation. He spent the rest of his life on this unsuccessful attempt to explain all of the properties of matter and energy in a single mathematical formula.

In 1939, shortly before the outbreak of World War II in Europe, Einstein learned that two German chemists had split the uranium atom. Enrico Fermi, an Italian physicist who lived in the United States, proposed that a chain-reaction splitting of uranium atoms could release enormous quantities of energy. That same year Einstein wrote to President Franklin D. Roosevelt warning him that this scientific knowledge could lead to Germany's development of an atomic bomb. He suggested that the United States begin preparations for its own atomic bomb research. Einstein's urging led to the creation of the Manhattan Project and the development of the first two atomic bombs in 1945. Einstein died in Princeton, N.J., on April 18, 1955.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Niels Bohr”

One of the foremost scientists of the 20th century, the Nobel prize winning physicist Niels Bohr was the first to apply the quantum theory to atomic structure. His interpretation of the meaning of quantum physics was to become a basic tenet of the science.

Niels Henrik David Bohr was born in Copenhagen, Denmark, on Oct. 7, 1885. His father was a professor of physiology at the University of Copenhagen, and young Bohr grew up among scientists. He entered the university in 1903, winning in 1907 the gold medal of the Royal Danish Academy of Sciences and Letters for his experiments with the vibrations of water to determine its surface tensions.

In 1911 Bohr went to England to study with J.J. Thomson and Ernest

Rutherford. His first great work began with a study of the theoretical implications of the nuclear model of the atom proposed by Rutherford. In 1913 he combined the concept of the nuclear atom with the quantum theory of Max Planck and Albert Einstein, departing radically from classical physics. He returned to Copenhagen in 1916 as a professor at the university, becoming director in 1920 of the university's Institute for Theoretical Physics, to which he attracted world-renowned physicists. In 1922 he won the Nobel prize for physics for his work on atomic structure.

When Bohr visited the United States early in 1939, he brought with him the knowledge that German scientists had succeeded in splitting the uranium atom. Bohr worked during the winter of 1939–40 at Princeton University, where he developed the theory of atomic fission that led directly to the first atomic bomb. He returned to Denmark in 1940.

After the Germans occupied his country, Bohr was active in the anti-Nazi resistance movement. Under threat of arrest because of his Jewish ancestry, he escaped by fishing boat to Sweden in 1943. He was then flown secretly to England. In the United States he was an adviser on the atomic bomb project but did not remain to see the first test bomb exploded. In 1957 he received the first United States Atoms for Peace award. He died in Copenhagen on Nov. 18, 1962. Bohr's essays were collected in 'Atomic Theory and the Description of Nature' (1934); 'Atomic Physics and Human Knowledge' (1958); and 'Essays, 1958–1962, on Atomic Physics and Human Knowledge' (1963). His son, Aage Bohr, was a joint winner of the Nobel prize in physics in 1975 for his own work on atomic structure.

UNIT 5

PRETEXT EXERCISES

1. Practice in pronunciation:

Zealand /'zi:lənd/, Ernest Rutherford /'ɜ:nɪst 'rʌðəfɔ:d/, quantum /'kwɒntəm/, investigation /ɪn'vestrɪ'geɪʃn/, through /θru:/, charge /tʃa:dʒ/, tiny /'taɪni/, nucleus /'nju:klɪəs/, inspire /ɪn'spaɪə/, receive /rɪ'si:v/, society /sə'saɪəti/.

2. Pay attention to the pronunciation of the verb endings:

/d/ laid, realized, charged, inspired, received, discovered.

/t/ worked, developed.

/ɪd/ investigated, experimented, concentrated, generated.

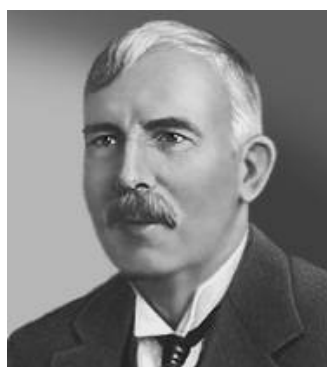
3. Read and translate the following international words:

foundation /faʊn'deɪʃn/, quantum /'kwɒntəm/, theory /'θɪəri/, radioactivity /'reɪdɪəʊæktɪvəti/, nature /'neɪtʃə/, structure /'strʌktʃə/, atom /'ætəm/, realize /'rɪəlaɪz/, concentrate /'kɒnsəntreɪt/, centre /'sentə/, leader /'li:də/, inspire /ɪn'spaɪə/, prize /praɪz/, chemistry /'kɛmɪstri/, president /'prezɪdənt/.

Listening and reading for information:

Text A

ERNEST RUTHERFORD (1871 – 1937) /'ɜ:nɪst 'rʌðəfɔ:d/



The New Zealand-born British physicist Ernest Rutherford laid the foundation for the development of nuclear physics and modern quantum theory. He investigated radioactivity and the nature of alpha (positively charged) particles. His most significant

discovery was the nature of the structure of the atom. He realized through his experiments that the positive charge of an atom is concentrated at its center in a tiny, dense nucleus. Rutherford's work and leadership inspired two generations of scientists. In 1908 he received the Nobel Prize for chemistry, and in 1925 he became president of the Royal Society, London.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Who laid the foundation for the development of nuclear physics and modern quantum theory?

What did Ernest Rutherford investigate?

His most significant discovery was the nature of the structure of the atom, wasn't it?

Is the positive charge of an atom concentrated in the centre or in electron?

Who did Rutherford's work inspire?

What did Rutherford receive the Nobel Prize for?

In 1925 he became president of the Royal Society, didn't he?

2. State whether these sentences are true or wrong using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say

To tell the truth

Unfortunately

Most likely

Ernest Rutherford laid the foundation for the development of chemistry.

His most significant discovery was the nature of the structure of stars.

The positive charge of an atom is concentrated at its centre.

In 1908 he received the Nobel Prize for literature.

3. Remember the derivatives of the words:

'physics – 'physical – 'physicist

'signify – sig'nificant – sign

in'spire- ,inspi'ration – in'spirer

'generate – ,gene'ration- 'generator

'concentrate – ,concen'tration – 'concentrator

4. Find the corresponding English equivalents to the Russian expressions:

получать премию, заложить основание, исследовать, значительное открытие, вдохновлять поколение, стать президентом, положительно заряженный, скапливаться, крохотное ядро.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find sentences containing Participle II and Passive Voice.

C. Give the initial forms of the following words:

laid, development, charged, became, positively, nuclear, born, foundation, was.

6. Fill in the blanks with the propositions where necessary:

Ernest Rutherford laid the foundation ... the development ... nuclear physics.

The positive charge ... an atom is concentrated ... its centre.

... 1908 he received the Nobel Prize ... chemistry.

He became president ... the Royal Society.

7. Put the words in the correct word order:

physics, for, the, of, nuclear, development, Ernest, the, laid, Rutherford, foundation.

inspired, of, scientists, generations, and, Rutherford, work, leadership, two.

chemistry, in, he, 1908, the, prize, Nobel, received, for.

8. Complete the sentences:

The positive charge of

Rutherford's work

His most significant

In 1908 he received

9. Look for some additional information about Ernest Rutherford in Internet, encyclopedia, reference books and other sources.

Text B

JOSEPH THOMSON (1856 – 1940) /'dʒəʊzəf 'tɒmsən/



The English physicist Joseph Thomson made a major breakthrough in scientific understanding of the structure of the atom, proposing a model that became known as the Thomson atom. His work provided practical proof of many of the new theories that were being put forward about atomic structure at the time. Several years later, in 1906, he received a Nobel Prize for physics for his research into the electrical conductivity of gases. Thomson was a great teacher and an outstanding scientist. Seven of his students and assistants also received Nobel Prize for their work.

1. Get acquainted with the technical terminology in the field of physics:

nuclear, quantum, structure, gravity, space, energy, positively charged, nucleus, conductivity.

2. Speak about the role Ernest Rutherford and Joseph Thomson played in understanding of the structure of the atom

3. Look through the texts once more and say what is common between Ernest Rutherford and Joseph Thomson in the investigations of the atomic structure.

4. Look over the texts again and answer :

What is the main idea of the texts?

What are the details?

What conclusions can be drawn?

What is the purpose of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Ernest Rutherford”

One of the great pioneers in nuclear physics, Ernest Rutherford discovered radioactivity, explained the role of radioactive decay in the phenomenon of radioactivity, and proved that the positive electric charge in every atom is concentrated in a nucleus at the heart of the atom. Rutherford was also the first to transmute one chemical element into another by artificial means.

Ernest Rutherford was born near Nelson, New Zealand, on Aug. 30, 1871. His father was a wheelwright. Ernest attended school in Nelson. In 1895 he won

a scholarship to Cambridge University in England. His brilliance as a graduate student under Joseph J. Thomson won him a professorship of physics at McGill University in Montreal, Que., in 1898. In 1900 he returned to New Zealand to marry.

By 1902 Rutherford, in collaboration with Frederick Soddy, had succeeded in establishing a new branch of physics called radioactivity. He and Soddy published their findings on the properties of alpha and beta particles and on gamma-ray emission during radioactive decay. Their findings included the chain of decay from uranium through lighter elements. For this work Rutherford was awarded the Nobel prize in chemistry in 1908.

In 1907 Rutherford accepted a post at Manchester University in England. By 1911, after studying the deflection of alpha particles through gold foil, he had established the nuclear theory of the atom. One of his students, Niels Bohr, used Rutherford's model of the atom to describe the hydrogen spectrum in terms of the quantum theory. Another student, Henry G.J. Moseley, used Rutherford's model, Bohr's theory, and his own X-ray diffraction studies to develop a new explanation of the periodic table of the elements in terms of atomic numbers.

During World War I Rutherford worked on methods of submarine detection. In April 1919 he succeeded Thomson as director of Cambridge University's Cavendish Laboratory. In June of that year Rutherford announced his success in artificially disintegrating nitrogen into hydrogen and oxygen by alpha particle bombardment. Rutherford then spent several years directing the development of proton accelerators (atom smashers). In 1932 John D. Cockcroft and E.T.S. Walton of Rutherford's group used the first workable atom smasher to artificially disintegrate lithium into helium.

Knighthood in 1914, Rutherford was raised to the peerage as the first Baron Rutherford of Nelson in 1931—a barony that ceased to exist after his death. He also served as president of the Royal Society (1925–30) and as chairman of the

Academic Assistance Council. He died at Cambridge on Oct. 19, 1937, and was buried at Westminster Abbey, in London.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Joseph Thomson”

The renowned British physicist Joseph J. Thomson was the discoverer of the electron. His research laid the foundation for developments of great importance in electricity, electronics, chemistry, and other sciences. He won the Nobel prize for his work on the conduction of electricity through gases.

Thomson was born on Dec. 18, 1856, in Cheetham, near Manchester, England. His father was a publisher and bookseller. Young Thomson planned to become an engineer, but while studying at Owens College he developed an intense interest in physics. He took advanced studies at Cambridge University, where he became a lecturer in 1882. Thomson published a treatise on vortex rings in 1883 that showed his early interest in the structure of the atom.

His work as a teacher and researcher impressed Cambridge authorities so favorably that he was appointed to the important Cavendish professorship of experimental physics when the chair became vacant in 1884. He soon gathered a brilliant group of students who also acted as research assistants. Seven of them later won Nobel prizes. During this period Thomson was engaged chiefly in electromagnetic experiments.

In 1893 he published the results of these studies in ‘Notes on Recent Researches in Electricity and Magnetism’. He gave a course of lectures at

Princeton University in 1896, summarizing his researches on the discharge of electricity through gases.

During 1896 he also conducted an investigation of cathode rays. On April 30, 1897, he startled the scientific world by announcing that the particles composing cathode rays were much smaller than atoms. These particles were later called electrons.

In his later researches Thomson found isotopes of the element neon and developed an electrical method for separating different kinds of atoms and molecules. He received the Nobel prize in 1906. Among his other honors were a British knighthood, the Order of Merit, the Copley medal of the Royal Society, and honorary degrees from many universities. He was president of the Royal Society from 1915 to 1920. During World War I he served on the Admiralty Board of Invention and Research.

He married Rose Elizabeth Paget in 1890. They had a son, George, who became a noted physicist, and a daughter. Thomson died at Cambridge on Aug. 30, 1940, and was buried in Westminster Abbey.

UNIT 6

PRETEXT EXERCISES

1. Practice in pronunciation:

Isaac /'aɪzək/, physicist /'fɪzɪsɪst/, mathematician /,mæθəmə'tɪʃn/, science /'saɪəns/, gravity /'ɡreɪvɪtɪ/, discover /dɪs'kʌvə/, law /lɔː/, motion /'məʊʃən/, light /laɪt/, colour /'kʌlə/, spectrum /'spektrəm/, research /rɪ'sɜːts/, design /dɪ'zaɪn/, telescope /'telɪskəʊp/, pioneer /,paɪə'nɪə/, calculus /'kælkjʊləs/

2. Pay attention to the pronunciation of the verb endings:

/d/ revolutionized, laid, discovered, used, coloured, designed, called.

/t/ developed, researched.

/ld/ reflected, founded.

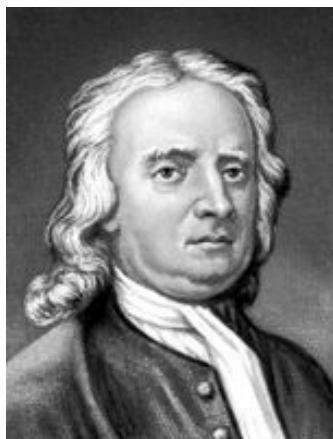
3. Read and translate the following international words:

physicist /'fɪzɪsɪst/, mathematician /,mæθəmə'tɪʃn/, theory /'θɪəri/, revolution /,revə'luːʃn/, foundation /faʊn'deɪʃn/, history /'hɪstəri/, modern /'mɒdən/, colour /'kʌlə/, person /'pɜːsn/, spectrum /'spektrəm/, reflect /rɪ'flekt/, telescope /'telɪskəʊp/, pioneer /,paɪə'nɪə/, mathematics /,mæθə'mætɪks/.

Listening and reading for information:

Text A

ISAAC NEWTON (1643 – 1727) /'aɪzək 'njuːtn/



The English physicist and mathematician Isaac Newton was one of the greatest scientists of all time. His theories revolutionized scientific thinking and laid the foundations of modern physics. His book *Principia Mathematica* is one of the most important works in the history of modern science. Newton discovered the law of

gravity, and developed the three laws of motion that are still in use today. He was the first person to split white light into the colours of the spectrum, and his research into light led him to design a reflecting telescope. Newton was also one of the pioneers of a new branch of mathematics called calculus.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Who is this text about?

Isaac Newton laid the foundation of modern physics, didn't he?

What law did he discover?

Whose book is one of the most important works in the history of modern science?

Who was the first person to split white light into the colors of the spectrum?

What led Isaac Newton to design a reflecting telescope?

2. State whether these sentences are right or wrong using the following clichés:

As far as I know

I suppose

I mean

I must confess

I must disappoint you

The thing is

I hope

Actually

I guess

In my opinion

They say

Unfortunately

Well, it seems

To start with

I think

I suggest

I believe

In fact

If I'm not mistaken

Frankly speaking

The fact is

I'm afraid

To tell the truth

Most likely

Isaac Newton was one of the greatest actors of all time.
He laid the foundations of modern chemistry.
Newton discovered the law of gravity.
He was the first to split white light into the colors of the spectrum.
Isaac Newton designed a reflecting telescope.

3. Remember the derivatives of the words:

ˌMathe'matics-ˌmathema'tician-mathe'matical

De'sign-de'signer-desig'nation

'Theorize-'theory-theo'retical

Science-sci'en'tific-'scientist

De'velop-de'velopment-de'veloper

Re'flect-re'flection-re'flector

Found- foun'dation-'founder

4. Find the corresponding English equivalents to the Russian expressions:

Выдающийся ученый, заложить основание, открыть закон тяготения, расщепление света, построить отражающий телескоп, область науки, развивать законы движения.

5. Grammar Review

A. Find in the text irregular verbs and their three forms.

B. Find Infinitive and Participle II in the text and state their functions.

C. Give the initial forms of the following words:

revolutionized, reflecting, called, greatest, mathematician, colours, scientist, thinking.

6. Fill in the blanks with the propositions where necessary:

Isaac Newton was one ... the greatest scientists ... all time.

He developed the three laws ... motion that are still use today.

His research ... light led him to design a reflecting telescope.

Newton was the first person to split white light ... the colours ... the spectrum.

7. Put the words in the correct word order:

theories, scientific, his, thinking, revolutionized.

he, discovered, Newton, gravity, law, of.

Colors, the, into, of, the, light, spectrum, to, white, split, the, person, he, first, was.

8. Complete the sentences:

He was the first person

His theories revolutionized

Newton discovered

He was also one of

9. Look for some additional information about Isaac Newton in Internet, encyclopedia, reference books and other sources.

Text B

GOTTFRIED LEIBNIZ (1646 – 1716) /'gɒtfrɪd 'laɪbnɪz/



The German mathematician and philosopher Gottfried Leibniz was an outstanding thinker who developed a method of computation called calculus. Both Leibniz and the English scientist Isaac Newton (1642-1727) claimed to be first with the theory of calculus. In fact they developed it simultaneously and independently. Leibniz's knowledge was vast and diverse, covering all the

intellectual disciplines of his day, including logic and optics. He also played an important role in European politics, confirming his patron-George Louis of Hanover - as the heir to the British throne, which he assumed, as George I, in 1714.

1. Get acquainted with the technical terminology:

Computation, calculus, optics, motion, gravity, light, split, spectrum, telescope, reflect.

2. Look the text through and say what is in common in the research of Isaac Newton and Gottfried Leibniz.

3. Look over the texts A and B again and answer

What is the main idea of the texts?

What are the details?

What conclusions can be drawn?

What is the purpose of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Isaac Newton”

The chief figure of the scientific revolution of the 17th century was Sir Isaac Newton. He was a physicist and mathematician who laid the foundations of calculus, extended the understanding of colour and light, studied the mechanics of planetary motion, and discovered the law of gravitation. His work established the commonly held scientific view of the world until Albert Einstein

undermined it in the early 20th century.

Isaac Newton was born on Dec. 25, 1642, in Woolsthorpe, England. His father died before Isaac was born and left the family with little money. Isaac's mother soon remarried and had three more children. She expected Isaac to manage her considerable property after she was widowed a second time. Since he paid little attention to the family farm, Isaac was sent back to grammar school at Grantham to prepare for the university. When he arrived at Trinity College, University of Cambridge in 1661, he learned of the scientific revolution that had been going on in Europe through the work of Galileo, Nicolaus Copernicus, Johannes Kepler, and René Descartes. Abandoning the university's Aristotelian teachings for studies in natural philosophy, Newton became intrigued with atomists, who proposed that everything in nature is ultimately made of indivisible particles of matter—atoms. At the same time Newton created the basis for his mathematical discoveries. In 1665 Newton returned to Woolsthorpe and continued his study of light, gravity, and mathematics that led him to three of the greatest discoveries in the history of science.

Newton's experiments with light showed that white light passed through a prism broke up into a wide colour band, called a spectrum. Passed through another prism, the colour band became white light again. Next he passed a single colour through a prism. It remained unchanged. From this he concluded that white light is a mixture of pure colors. He also formulated the corpuscular theory of light, which states that light is made up of tiny particles, or corpuscles, traveling in straight lines at great speeds.

The general law of gravitation arose from Newton's question: what keeps the moon in its regular path around the Earth? He decided that only the attraction of the Earth and the moon for each other could account for it.

In mathematics, Newton used the concepts of time and infinity to calculate the slopes of curves and the areas under curves. His fluxional

method—later known as calculus—was developed in 1669 but was not published until 1704.

Newton continued his scientific research when he was appointed professor of mathematics at Cambridge in 1669. Three years later he invented the reflecting telescope. In 1687 he published his major work, 'Principia' (Philosophiae Naturalis Principia Mathematica, or Mathematical Principles of Natural Philosophy), setting forth the theory of gravitation. He also served a term in Parliament.

In 1696 Newton was appointed warden of the mint. At that time a complete recoinage and standardization of coins was taking place. When the project was completed in 1699, he was made master of the mint. He was elected president of the Royal Society in 1703 and was knighted in 1705. Newton died in London on March 20, 1727, and was the first scientist to be honoured with burial in Westminster Abbey.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Gottfried Wilhelm Leibniz”

Although he was not an artist, Leibniz was in many other ways comparable to Leonardo da Vinci. He was recognized as the universal genius of his time, a philosopher and scientist who worked in the fields of mathematics, geology, theology, mechanics, history, jurisprudence, and linguistics.

Gottfried Wilhelm Leibniz was born in Leipzig, Germany, on July 1, 1646. He was educated at the University of Leipzig and received a doctorate in law at the University of Nuremberg. Because he was forced to earn a living, he

spent his entire adult life in the service of nobility and royalty, particularly for the House of Brunswick-Lüneberg in Germany. His last employer was Duke George Louis of Hanover, who became King George I of England in 1714. This employment enabled Leibniz to travel a great deal throughout Europe and meet the leading scholars of his day. His many duties did not interfere with his extensive intellectual pursuits.

During his lifetime Leibniz perfected the calculating machine invented by Blaise Pascal; laid the ground for integral and differential calculus; founded dynamics, an area of mechanics; worked on mechanical devices such as clocks, hydraulic presses, lamps, submarines, and windmills; perfected the binary system of numeration used today in computer operations; devised the theory that all reasoning can be reduced to an ordered combination of elements such as numbers, words, sounds, or colors (the theoretical basis of modern computers); laid the foundation for general topology, a branch of mathematics; strove to formulate a basis for the unification of the churches; and pursued the goal of writing a universal history. He also continued to perfect his metaphysical system through research into the notion of a universal cause of all being.

Leibniz published his philosophy in several works. 'Reflections on Knowledge, Truth, and Ideas' defined his theory of knowledge. In 'On the Ultimate Origin of Things' he tried to prove that only God could be the source of all things. 'Theodicy', his only major work published in his lifetime, explained his ideas on divine justice. 'Monadology', written two years before his death, spelled out his theory of monads, which he conceived of as simple, unextended, spiritual substances that formed the basis for all composite forms of reality. His theory of monads—a term derived from the Greek word meaning “that which is one” or “unity”—is elaborated in 'Monadology' and in 'Principles of Nature and Grace Founded in Reason'. The theory attempts to describe a harmonious universe made up of an infinite number of monads, or units, arranged in a

hierarchy and originating in the Supreme Monad, which is God. Monadology had its roots in the philosophy of ancient Greece and was carried on by such eminent thinkers as Immanuel Kant, Edmund Husserl, and Alfred North Whitehead. The hierarchy of monadology was, according to Leibniz, the “best of all possible worlds.” The philosopher died in Hanover on Nov. 14, 1716.

UNIT 7

PRETEXT EXERCISES

1. Practice in pronunciation:

theoretical /ˌθiə'reɪtɪkl/, quantum /'kwɒntəm/, regard /rɪ'gɑ:d/, purely /'pjʊəli/, theory /'θiəri/, energy /'enədʒi/, radiation /ˌreɪdɪ'eɪʃn/, continuous /kən'tɪnjʊəs/, divide /dɪ'vaɪd/, tiny /'taɪni/, packets /'pækɪt/, quanta /'kwɒntə/, formula /'fɔ:mʊlə/, explain /ɪk'spleɪn/, behavior /bɪ'heɪvjə/, microscopic /ˌmaɪkrəs'kɒpɪk/, award /ə'wɔ:d/, physics /'fɪzɪks/.

2. Pay attention to the pronunciation of the verb endings:

/d/ proposed, discovered, explained, combined, described,

/t/ produced.

/ɪd/ suggested, divided, awarded, included, regarded.

3. Read and translate the following international words:

quanta /'kwɒntə/, person /'pɜ:sən/, combination /ˌkɒmbɪ'neɪʃn/, energy /'enədʒi/, radiation /ˌreɪdɪ'eɪʃn/, formula /'fɔ:mʊlə/, universal /ˌju:nɪ'vɜ:səl/, constant /'kɒnstənt/, matter /'mætə/, microscopic /ˌmaɪkrəs'kɒpɪk/, scale /skeɪl/, prize /praɪz/.

Listening and reading for information:

Text A

MAX PLANCK (1858 – 1947) /mæks plænk/



The German theoretical physicist Max Planck is regarded as the father of quantum theory. He was the first person to propose that light is neither purely a wave nor purely a particle, but is a combination of both. He suggested that the energy in radiation was not continuous but was divided into tiny packets, or quanta. In 1900 he produced

a formula to describe the size of a quantum of energy. This formula included a universal constant, Planck's constant, which is used to explain the behavior of matter and energy on a microscopic scale. Planck was awarded the Nobel Prize for physics in 1918 & for these discoveries.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Who is regarded as the father of quantum theory?

Max Planck proposed that light is a combination of a wave and a particle, didn't he?

What is the energy in radiation divided into?

Did Planck produce a formula to describe the size or amount of a quantum of energy?

What was Planck awarded for?

2. State whether these sentences are right or wrong using the following clichés:

As far as I know

I suppose

I mean

I must confess

I must disappoint you

The thing is

I hope

Actually

I guess

In my opinion

They say,

Unfortunately

Well, it seems

To start with

I think

I suggest

I believe

In fact

If I'm not mistaken

Frankly speaking

The fact is

I'm afraid

To tell the truth

Most likely

Max plank is regarded as the father of a modern chemistry.

He suggested that the energy was divided into tiny particles called electrons.

In 1900 he produced a formula to describe the size of an atom.

Plank was awarded the Nobel Prize for literature in 1918.

Planck's constant is used to explain the behavior of matter and energy on a microscopic scale.

3. Remember the derivatives of the words:

theory – theoretical – theorize

propose – proposal – proposition

combine – combinations

suggest – suggestion

radiate – radiation

divide – division

produce – producer – production

describe –description

include – inclusion

explain – explanation

discover- discovery

4. Find the corresponding English equivalents to the Russian expressions:

считается отцом, объяснять поведение, награждать премией, предлагать, быть первым, определить размер, формула включала.

5. Grammar Review

A. Find in the text irregular verbs and their three forms.

B. Find the sentences with Passive Voice and Infinitive constructions.

C. Give the initial forms of the following words:

physicist, purely, combination, regarded, continuous, discoveries, theoretical,

produced, was.

6. Fill in the blanks with the propositions where necessary:

Max Planck is regarded as the father quantum theory.

The energy radiation was not continuous but was divided tiny packets.

Planck was awarded the Nobel Prize physics 1918 these discoveries.

Planck's constant is used to explain the behaviour matter and energy on a microscopic scale.

7. Put the words in the correct word order:

Planck, regarded, father, as, of, theory, the, quantum, Max, is.

included, a, this, universal, formula, constant.

is, of, the, matter, to, and, energy, Planck's, used, explain, constant, behaviour.

8. Complete the sentences:

He suggested that

Planck was awarded

He was the first

In 1900 he produced

The German theoretical

9. Look for some additional information about Max Planck in Internet, encyclopedia, reference books and other sources.

Text B

HENRI BECQUEREL (1852 – 1908) /'a:ŋri 'bekərəl/

French physicist Henri Becquerel was one of the first nuclear scientists. He worked in Paris, where, together with Polish-born French physicist Marie Curie

and her husband Pierre, he discovered radioactivity in uranium. He then went on to discover other radioactive elements. Becquerel developed the work of German physicist Wilhelm Roentgen (1845-1923), who discovered X-rays. An interest in photography helped Becquerel to discover the link between radioactivity, light, and magnetism. His work led to scientists using radioactivity to produce X-ray images. In 1903 Becquerel shared the Nobel Prize for physics with the Curies.

1. Get acquainted with the technical terminology in the field of physics:

radioactivity, uranium, X-rays, quantum, light, packet, matter, energy.

2. Look the texts through and say what is in common in the research of Max Planck and Henry Becquerel.

3. Look over the texts A and B again and answer ...

What is the main idea of the texts ?

What are the details?

What conclusions can be drawn?

What is the purpose of the author of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Max Planck”

Awarded the Nobel prize for physics in 1918, German physicist Max Planck is best remembered as the originator of the quantum theory. His work helped usher in a new era in theoretical physics and revolutionized the scientific

community's understanding of atomic and subatomic processes.

Max Karl Ernst Ludwig Planck was born on April 23, 1858, in Kiel, Germany. His father, a distinguished jurist and professor of law, taught at the University of Kiel. At the age of 9, Planck entered Munich's famous Maximilian Gymnasium, where a teacher, Hermann Müller, first stimulated his interest in physics and mathematics. Although Planck excelled in all subjects, he decided to pursue a career in physics over his other great love, music.

In 1874, Planck enrolled at the University of Munich but spent a year at the University of Berlin studying with physicists Hermann von Helmholtz and Gustav Robert Kirchhoff. He returned to Munich to work on the second law of thermodynamics and received his doctorate in 1879. The next year he became a lecturer at the University of Munich and in 1885 was appointed associate professor at Kiel. Four years later Planck received an appointment to the University of Berlin, where he soon was promoted to full professor of theoretical physics. He remained in Berlin until shortly before his death.

Planck's work on the second law of thermodynamics eventually led to his quantum theory formulations, now known as Planck's radiation law and Planck's constant (symbolized by h). Planck's radiation law is a mathematical relationship calculated to measure the radiation of energy by a blackbody, or perfectly radiating object. In formulating the law, Planck had to abandon one of his most cherished beliefs—that the second law of thermodynamics was an absolute law of nature. Instead, he had to accept the fact that the second law is a statistical law. In addition, Planck had to assume in his formulations that radiation is emitted, transmitted, and absorbed, not continuously but in discrete packets or quanta of energy.

He also introduced his constant h in his radiation law calculations. Planck's constant is the product of energy multiplied by time, a quantity called action, and is often defined as the elementary quantum of action. It is the

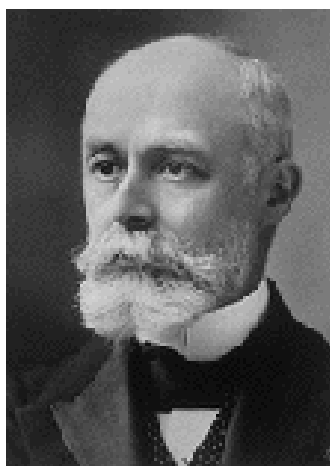
fundamental physical constant used in mathematical calculations of quantum mechanics, which describes the behavior of particles and waves on the atomic scale.

Planck announced his findings in 1900, but it was years before the full consequences of his revolutionary quantum theory were recognized. Throughout his life, Planck made significant contributions to optics, thermodynamics and statistical mechanics, physical chemistry, and other fields. In 1930 he was elected president of the Kaiser Wilhelm Society, which was renamed the Max Planck Society after World War II. Though deeply opposed to the fascist regime of Adolf Hitler, Planck remained in Germany throughout the war. He died in Göttingen on Oct. 4, 1947.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Henri Becquerel”



The French physicist who discovered radioactivity through his investigations of uranium and other substances was Henri Becquerel. In 1903 he shared the Nobel prize for physics with the chemists Pierre and Marie Curie.

Antoine-Henri Becquerel was born on Dec. 15, 1852, in Paris. He received his scientific education from 1872 to 1874 at the École Polytechnique and studied engineering from 1874 to 1877 at the École des Ponts et Chaussées (Bridges and Highways School).

A member of the Académie des Sciences since 1889, Becquerel had become a highly respected physicist by 1896. For several years he researched the rotation of plane-polarized light by magnetic fields. Even more important than his research were his expertise with phosphorescent materials, his familiarity with uranium compounds, and his general skill in laboratory techniques, including photography. These were to place the discovery of radioactivity within his reach.

After the discovery of the X ray in 1895, Becquerel began to investigate whether there was a fundamental connection between this form of invisible radiation and visible light. He theorized that luminescent materials, however stimulated, may yield X rays just as they emitted visible light. He tested this hypothesis by placing phosphorescent crystals on a sealed photographic plate that had been wrapped in opaque paper and never exposed to direct light. After the plate was developed, images were visible on it. He passed the results on to Madame Curie, who named this phenomenon radioactivity.

UNIT 8

PRETEXT EXERCISES

1. Practice in pronunciation:

physicist /'fɪzɪsɪst/, Marie Curie /'mæri 'kjuəri/, famous /'feɪməs/, Pierre /pʃiə/, inspire /ɪn'spaɪə/, polonium /pə'ləʊniəm/, radium /'reɪdʒəm/, isolate /'aɪsəleɪt/, continue /kən'tɪnjuː/, death /deθ/, research /rɪ'sɜːtʃ/, award /ə'wɔːd /, chemistry /'kemɪstri/.

2. Pay attention to the pronunciation of the verb endings:

/d/ inspired, used, continued.

/t/ looked, researched, worked.

/ld/ isolated, awarded.

3. Read and translate the following international words:

physicist /'fɪzɪsɪst/, radioactivity /ˌreɪdɪəʊæk'tɪvəti/, inspire /ɪn'spaɪə/, term /tɜːm/, substance /'sʌbstəns/, electromagnetic /ɪ'lektərəmæɡ'netɪk/, isolate /'aɪsəleɪt/, element /'elɪmənt/, polonium /pə'ləʊniəm/, radium /'reɪdɪəm/, professor /prə'fesə/, university /ˌjuːnɪ'vɜːsɪti/, medical /'medɪkəl/, prize /praɪz/, chemistry /'kemɪstri/.

Listening and reading for information:

Text A

MARIE CURIE (1867 – 1934) /'mæri 'kjuəri/



Polish-born physicist Marie Curie and her French husband Pierre are famous for their work on radioactivity. They were inspired by the work of the French physicist Henri Becquerel (1852-1908). Marie Curie was the first to use the term "radioactive" for substances that have considerable electromagnetic

activity. She also isolated two new radioactive elements, polonium and radium. After Pierre's death, she took over his job as professor of physics at the University of Paris, the first woman to teach there. She continued her research, looking for medical uses for radioactivity. She was awarded the Nobel Prize for physics in 1903 and for chemistry in 1911.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

What are Marie Curie and her husband Pierre famous for?

They were inspired by the work of the French physicist Henry Becquerel, weren't they?

Was Marie Curie the first to use the term "radioactive"?

What substances are named "radioactive"?

What new substances did Marie Curie isolate?

Did Marie Curie teach at the University of Paris or London University?

What purpose did she research radioactivity for?

She was awarded the Nobel Prize for physics, wasn't she?

2. State whether these sentences are right or wrong using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say,

To tell the truth

Unfortunately

Most likely

Marie Curie and her husband Pierre were famous for their work in the field of radio waves.

They were inspired by the work of the French chemist Antoine Lavoisier.

She was the first to use the term radioactive for substances that have considerable static electricity.

Marie Curie isolated two new radioactive elements, polonium and radium.

She continued her research, looking for military uses for radioactivity.

She was awarded the Lenin Prize for physics in 1903 for chemistry in 1911.

3. Remember the derivatives of the words:

'physics-'physicist-'physical

in'spire-, inspi'ration

con'sider-con'side'ration-con'siderable

'isolate-, iso'lation-'insulator

teach-'teacher-'teaching

'chemistry-'chemist-'chemical

4. Find the corresponding English equivalents to the Russian expressions:

знаменитый, быть первым, значительная активность, изолировать, после смерти, продолжать исследования, искать, награждать премией, работать над.

5. Grammar Review

A. Find in the text irregular verbs and their three forms.

B. Find in the text sentences with Passive Voice and Infinitive constructions.

C. Give the initial forms of the following words:

born, famous, inspired, considerable, radioactive, took, looking, medical, elements, were.

6. Fill in the blanks with the propositions where necessary:

Marie Curie and her husband Pierre are famous their work radioactivity.
..... Pierre's death she tookhis job as professor physicsthe
University of Paris.

She was awarded the Nobel Prize physics 1903 and chemistry
1911.

They were inspired the work the French physicist Henri Becquerel.

7. Put the words in the correct word order:

Henri, French, they, by, the, of, the, physicist, Becquerel, were, work, inspired.
isolated, she, elements, radioactive, also, new, two.
physics, over, as, she, professor, job, his, of, took.

8. Complete the sentences:

They were inspired

She also isolated

She was awarded.....

She continued

Marie Curie was

Polish-born

9. Look for some additional information about Marie Curie in Internet, encyclopedia, reference books and other sources.

Text B

PIERRE CURIE (1900 – 1958) /'pjɛə 'kjuəri/



Born in Paris, France, Pierre Curie became famous for his work on radioactivity and magnetism. From an early age he had great ability in mathematics. This led to his graduating from the University of Paris at just 18. His marriage to Paris immigrant Manya Skłodowska was the beginning of a world-famous partnership. Together they isolated two new radioactive elements, polonium and radium, and shared a Nobel Prize for physics in 1903 for their discovery of radioactivity. Pierre also worked on the properties of radioactive elements, identifying the existence of positive, negative, and neutral particles within an atom.

1. Get acquainted with the technical terminology in the field of physics:

neutral, positive, negative, particle, atom, element, magnetism, substance, polonium, radium, isolate.

2. Look the texts through and say what is in common in the research of Marie and Pierre Curie.

3. Look over the texts A and B again and answer ...

What is the main idea of the texts?

What are the details?

What conclusions can be drawn?

What is the purpose of the author of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Curie Family”

It is an unusual distinction for four members of one family to win Nobel prizes in science. The family to whom these honors came was that of the Curies, four individuals whose lives and work form a significant part of the history of nuclear physics in the 20th century.

Pierre Curie was born in Paris on May 15, 1859, and educated by his physician father. Before he met his future wife Marie, he had already done distinguished work in the study of crystals and magnetism at the Sorbonne and the School of Physics and Industrial Chemistry in Paris. With his brother Jacques, he discovered piezoelectricity. In 1882 Pierre was named supervisor of the School for Industrial Physics and Chemistry, where he continued his research.

Marie was born Manya Skłodowska in Warsaw, Poland, on Nov. 7, 1867. She took up her father's interest in mathematics and physics; and after her early schooling she went to Paris where she met Pierre Curie in 1894. They married on July 25, 1895, and began a scientific partnership that soon earned them international fame.

In 1898 the Curies announced the discovery of the chemical elements polonium and radium. In 1903 the Curies and Henri Becquerel shared the Nobel prize for physics for their discovery of radioactivity. On April 19, 1906, Pierre was struck by a horse-drawn carriage and killed. Marie carried on with her scientific work and became the first woman ever appointed to teach at the Sorbonne. In 1911 she was awarded the Nobel prize for chemistry for isolating

pure radium. She died of leukemia, caused by exposure to radiation during her work, on July 4, 1934.

Irène, the elder daughter of Pierre and Marie, was born in Paris on Sept. 12, 1897. Frédéric Joliot, who was to become her husband, was born in Paris on March 19, 1900. Irène received her doctorate in physics in 1925. That same year she met Frédéric working in her mother's laboratory. They married on Oct. 9, 1926, and for the next 30 years they continued to add to the work of the elder Curies. Their first efforts were directed at the study of atomic nuclei. Together they synthesized new artificial radioactive material. For their work they were awarded the Nobel prize for chemistry in 1935. During the late 1930s they did experiments that led to the development of nuclear fission. After World War II they were both active in the development of nuclear reactors and later in various peace movements. Irène died on March 17, 1956. Frédéric died on Aug. 14, 1958.

UNIT 9

PRETEXT EXERCISES

1. Practice in pronunciation:

Antoine Lavoisier /'æntuən levəə'zjə/, chemist /'kemɪst/, particularly /pɑ'tɪkjələli/, oxygen /'ɒksɪdʒən/, hydrogen /'haɪdrədʒən/, observe /əb'zɜ:v/, combine /kəm'baɪn/, produce /prə'dju:s/, describe /dɪ'skraɪb/, compound /'kɒmpaʊnd/, meticulous /mɪ'tɪkjələs/, manual /'mænjuəl/, scientific /,saɪən'tɪfɪk/, aftermath /'ɑ:ftəmæθ/, execute /'eksɪkjʊ:t/, guillotine /,gɪlə'ti:n/.

2. Pay attention to the pronunciation of the verb endings:

/d/ remembered, discovered, observed, combined.

/t/ worked, produced.

/ɪd/ experimented, executed.

3. Read and translate the following international words:

chemistry /'kemɪstri/, modern /'mɒdən/, gas /gæs/, combine /kəm'baɪn/, element /'elɪmənt/, experiment /ɪks'perɪmənt/, revolution /,revə'lʊ:ʃn/, execute /'eksɪkjʊ:t/, guillotine /,gɪlə'ti:n/, revolutionary /,revə'lʊ:ʃnəri/.

Listening and reading for information:

Text A

ANTOINE LAVOISIER (1743- 1794) /'æntuən levəə'zjə/



The French chemist Antoine Lavoisier is regarded as the father of modern chemistry. He is remembered particularly for his work on gases, gunpowder, and combustion. He discovered and named both oxygen and hydrogen, observing that these two gases combine to produce water. This led him to describe elements and

compounds, giving many the names by which they are known today. Lavoisier and his wife Marie (1758-1836) were meticulous scientists who produced some important manuals describing scientific experiments. In the aftermath of the French Revolution, Lavoisier was executed by guillotine by revolutionaries.

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

Who is regarded the father of modern chemistry?

What is Lavoisier remembered for?

Who discovered and named both oxygen and hydrogen?

What gases produce water?

Lavoisier and his wife were meticulous scientists, weren't they?

Is Lavoisier remembered for his work on gases or metals?

When was Lavoisier executed?

2. State whether these sentences are true or false using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say

To tell the truth

Unfortunately

Most likely

Lavoisier was hung by revolutionaries

Antoine Lavoisier is regarded the father of modern physics.

He discovered and named both oxygen and hydrogen.

He observed that these two gases combine to produce water.

Lavoisier and his wife produced some important manuals describing scientific experiments.

Antoine Lavoisier was shot by revolutionaries.

3. Remember the derivatives of the words:

'chemistry-'chemist-'chemical

di'scover-di'scovery

ob'serve- ,obser'vation-ob'server

com'bine-,combi'nation

pro'duce-pro'duction- pro'ducer

'science- 'scientist-,scien'tific

de'scribe-de,scription- de'scriptive

'execute-,exe'cution-e'xecutive

4. Find the corresponding English equivalents to the Russian expressions:

открывать, производить, давать название, дотошный, описывать опыты, казнить, важное пособие.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find sentences with Participle I and Infinitive and state their functions.

C. Give the initial forms of the following words:

regarded, giving, known, scientific, describing, was, revolutionaries, led, executed.

6. Fill in the blanks with the propositions where necessary:

He is remembered his work gases, gunpowder, and combustion.

The French chemist Antoine Lavoisier is regarded as the father modern Chemistry.

..... the aftermath the French Revolution, Lavoisier was executed..... guillotine revolutionaries.

7. Put the words in the correct word order:

was, by, executed, by, Lavoisier, guillotine, revolutionaries.

modern, of, father, the, as, Antoine, is, chemistry, regarded, Lavoisier.

oxygen, he, and, discovered, hydrogen, and, named, both.

8. Complete the sentences:

He is remembered particularly

Lavoisier and his wife

In the aftermath of the French Revolution,

He discovered and named

This led him to

9. Look for some additional information about Thomas Edison in Internet, encyclopedia, reference books and other sources.

Text B

DMITRY MENDELEYEV (1834 -1907) /'dmɪtri mende'leev/

The Russian chemist Dmitry Mendeleev is regarded as the father of the periodic table of chemical elements. He studied all the elements known at the time and discovered that they showed a regular repetition of properties when arranged in a certain order. He also predicted the discovery and properties of

new elements. All of these have now been isolated and named; one, mendeleevium, is named for Mendeleev. Mendeleev also experimented with agricultural production based on scientific principles, increasing its efficiency to such an extent that his methods came to be applied in many Russian industries.

1. Get acquainted with the technical terminology in the field of chemistry:

gunpowder, combustion, oxygen, hydrogen, hydrogen, observe, combine, produce, water, compound, repetition, property, arrange, order, predict, isolate, experiment.

2. Look the texts through and say what is in common in the research of Antoine Lavoisier and Dmitry Mendeleev.

3. Look over the texts A and B again and answer ...

What is the main idea of the texts ?

What are the details?

What conclusions can be drawn?

What is the purpose of the author of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Antoine Lavoisier”

One of the most honored men in the history of science is the Frenchman Antoine Laurent Lavoisier. For more than a century before his day, chemists had been hampered by a false theory about fire and the burning of matter. By

revealing the truth about fire and burning, Lavoisier helped chemistry make its remarkable advance from that time on.

Lavoisier was born in Paris on Aug. 26, 1743, the son of a wealthy lawyer and landowner. His father bought a title of nobility and wanted an aristocratic career for the boy. Young Lavoisier preferred science, however, so his father sent him to many distinguished scholars. He eventually studied mathematics at Mazarin College under Abbé Lecaille and botany under the renowned botanist Bernard de Jussieu. Lavoisier was much influenced by a family friend, the French geologist Jean-Étienne Guettard, and contributed to the latter's geologic and mineralogic atlas. In 1788 he presented his theory on geological stratification to the Academy of Sciences.

When Lavoisier was but 23 he won a prize from the Academy for an essay on the lighting of cities. In 1768 he was elected to the Academy, an unusual honor for so young a man. The same year he was appointed to the *ferme générale*—a body of men who held the right to “farm” (collect) taxes. In 1776 he began a career as director of the government arsenal.

The American Colonies issued their Declaration of Independence in the same year, and soon colonial troops were using his improved gunpowder. By 1783 Lavoisier had solved what was the most significant chemical problem of the day by proving the connection between oxygen and fire. By brilliant experiments and delicate measurements, Lavoisier proved that burning, the rusting of metals, and the breathing of animals all consisted of the union of oxygen with other chemicals.

Since this union, called oxidation, is one of the most important chemical processes, his discovery started the development of modern chemistry. He published his conclusions in 1789 in a work called ‘*Traité élémentaire de chimie*’ (Elements of Chemistry).

Lavoisier had become commissioner of weights and measures, and in

1791 he was appointed a commissary of the treasury. In 1794, however, the French revolutionists accused him and other members of the ferme générale of plotting to cheat the government. Because of this he was executed in Paris by the revolutionary tribunal on May 8, 1794.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Dmitry Mendeleev” (1834-1907)



Mendeleev was born in Tobol'sk, Siberia, on Feb. 8, 1834. After his father's blindness and death in 1847, his mother operated a glass factory. When the factory was destroyed by fire, the family moved to Moscow and later to St. Petersburg, where Dmitry attended the Pedagogical Institute. He qualified as a teacher in 1855 and was sent south to Odessa to continue studies in chemistry. He received his first university post in 1857 and was sent to the University of Heidelberg (1859–61) for further study. Once back in St. Petersburg he took up editing and scientific writing. He became a professor of chemistry at the Technical Institute in 1864. His textbook, 'The Principles of Chemistry', was published in 1868–70.

While writing the book he began to investigate the relationships between chemical elements. Out of this research came the periodic table that listed all of the elements by atomic weight and grouped them into related categories. Once the table was accepted, it became very useful in understanding the radioactive decay process by which one element is transformed into another.

Mendeleyev also made significant contributions to Russian industry and agriculture. Driven from teaching because of his progressive social views, his last years were spent as head of the Bureau of Weights and Measures. He died on Feb. 2, 1907.

UNIT 10

PRETEXT EXERCISES

1. Practice in pronunciation:

James Prescott Joule /dʒeɪmz 'preskɒt 'dʒəʊl/, physicist /'fɪzɪsɪst/, famous /'feɪməs/, experiment /ɪk'sperɪmənt/, discover /dɪ'skʌvə/, various /'veəriəs/, mechanical /mɪ'kæni:kəl/, heat /hi:t/, joule /dʒəʊl/, however /haʊ'evə/, scientist /'saɪəntɪst/, include /ɪn'klu:d/, chemist /'kemɪst/.

2. Pay attention to the pronunciation of the verb endings:

/d/ discovered, formed, changed, trained

t/ worked, researched.

/ɪd/ experimented, heated, included.

3. Read and translate the following international words:

physicist /'fɪzɪsɪst/, experiment /ɪks'perɪmənt/, form /fɔ:m/, energy /'enədʒɪ/, mechanical /mɪ'kæni:kəl/, electrical /ɪ'lektɪkəl/, base /beɪs/, academic /,ækə'demɪk/, training /'treɪnɪŋ/, post /pəʊst/, leader /'li:də/, chemist /'kemɪst/.

Listening and reading for information:

Text A

JAMES PRESCOTT JOULE (1818 – 1889)

/dʒeɪmz 'preskɒt 'dʒəʊl/



The English physicist James Prescott Joule is famous for his experiments with heat. He discovered that the various forms of energy - mechanical, electrical, and heat - are basically the same and that one form can be changed into another. Joule's research was so significant that his name was given to a unit of work or energy, the joule. Joule did

not have any formal academic training or an academic post. However, he worked with some of the leading scientists of the time, including the English chemist John Dalton (1766-1844), and the Scottish physicist Lord Kelvin (1824-1907).

EXERCISES AND ASSIGNMENTS

1. Comprehension check.

What is James Prescott famous for?

Can the various forms of energy be changed into another?

Joule's research was significant, wasn't it?

Was his name given to a unit of work or energy?

Joule didn't have any formal academic training, did he?

What leading scientists did he work with?

2. State whether these sentences are true or false using the following clichés:

As far as I know

Well, it seems

I suppose

To start with

I mean

I think

I must confess

I suggest

I must disappoint you

I believe

The thing is

In fact

I hope

If I'm not mistaken

Actually

Frankly speaking

I guess

The fact is

In my opinion

I'm afraid

They say,

To tell the truth

Unfortunately

Most likely

The English physicist James Prescott Joule is famous for his experiments with nuclear energy.

He worked with some of the leading scientists of the time, including Joseph Thomson and Isaac Newton.

His name was given to a unit of work or energy.

James Prescott got his academic training at Oxford.

The various forms of energy are quite different and can't be converted into another.

3. Remember the derivatives of the words:

'physics-'physical-'physicist

ex'periment-ex'periment-ex,peri'mental

di'scover-di'scovery

me'chanics-me'chanical

re'search-re'searcher

'signify-sig'nificance-sig'nificant

a'cademy-,aca'demic-a,cade'mician

train-'training-'trainer

lead-'leader-'leadership-'leading

'science-'scientist-,scien'tific

4. Find the corresponding English equivalents to the Russian expressions:

известный, тепло, сделать открытие, превращать в, единица энергии, академическое образование, ведущий ученый, включать.

5. Grammar Review

A. Find in the text irregular verbs and give their three forms.

B. Find sentences with Passive Voice and Participle I in the text.

C. Give the initial forms of the following words:

mechanical, basically, including, leading, worked, famous, significant, given, training, chemist.

6. Fill in the blanks with the propositions where necessary:

The English physicist James Prescott Joule is famous his experiments heat.

His name was given a unit work or energy.

He worked some the leading scientists the time.

7. Put the words in the correct word order:

changed, various, another, into, forms, energy, of, be, can.

training, Joule, not, any, academic, have, did.

name, or, work, of, energy, to, a, was, his, given, unit.

8. Complete the sentences:

However, he worked

He discovered that

Joule's research was

Joule didn't have

The English physicist

9. Look for some additional information about James Prescott Joule in Internet, encyclopedia, reference books and other sources.

Text B

STEPHEN HAWKING /'stefn 'hɔ:kɪŋ/

The English mathematical physicist Stephen Hawking is at the forefront of fundamental scientific research. His work has built on the theories of

relativity originally put forward by the German-born American scientist Albert Einstein (1879-1955). Hawking's explanations of the formation of the universe, and of black holes in space, have become widely accepted among scientists the world over. Hawking is now a household name, thanks to his best-selling book "A Brief History of Time." His success is all the more remarkable because he suffers from a disease that has all but robbed him of speech and movement.

1. Get acquainted with the technical terminology in the field of physics:

relativity, space, heat, mechanics, electricity, change, unit, universe, formation.

2. Look the texts through and say what is in common in the research of James Prescott Joule and Steven Hawking.

3. Look over the texts A and B again and answer ...

What is the main idea of the texts ?

What are the details?

What conclusions can be drawn?

What is the purpose of the author of the texts?

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C "James Prescott Joule"

After studying under John Dalton, in 1840 he described "Joule's law," which stated that the heat produced in a wire by an electric current is proportional to the product of the resistance of the wire and the square of the current. In 1843 he published his value for the amount of work required to

produce a unit of heat, called the mechanical equivalent of heat, and established that heat is a form of energy. He established that the various forms of energy are basically the same and can be changed from one into another, a discovery that formed the basis of the law of conservation of energy, the first law of thermodynamics. In his honour, the value of the mechanical equivalent of heat is usually represented by the letter J, and a standard unit of work is called the joule.

Supplementary Reading

Read and translate text C. Dictionaries are allowed. Divide text C into logical parts and find the topical sentences of each part. Write a short summary of the text C using the topical sentences.

Text C “Stephen Hawking” born in 1942



One of the most admired and brilliant theoretical physicists of the 20th century, Stephen Hawking became a widely known celebrity as well after his book “A Brief History of Time”: “From the Big Bang to Black Holes” unexpectedly became a best-seller in 1988 (a motion picture based on the book followed). He specialized in the study of black holes, the elusive remains of collapsed giant stars. He also worked in the areas of general relativity, thermodynamics, and quantum mechanics in seeking to understand how the universe began. His achievements have proved all the more amazing because he suffered since the early 1960s from the severely debilitating Lou Gehrig's disease—amyotrophic lateral sclerosis—which gradually destroys the nerve and muscle systems.

Stephen William Hawking was born on Jan. 8, 1942, in Oxford, England, and grew up in London. He attended St. Albans School and entered Oxford University in 1959. Upon graduating in 1962 he moved to Cambridge University to study theoretical astronomy and cosmology. It was at this time he was diagnosed with Lou Gehrig's disease, named for the American baseball player who died from it in 1941. As the disease worsened, Hawking was confined to a motorized wheelchair. In time, he was unable to write and barely able to speak. He, however, proceeded to work on his doctorate and in 1965 married a fellow student, Jane Wilde. (The marriage lasted until 1990.)

After receiving his doctorate in 1966, he remained at Cambridge as a member of the department of applied mathematics. He was appointed professor of gravitational physics in 1977 and Lucasian professor of mathematics (a chair previously held by Sir Isaac Newton) in April 1980. His earliest work, in collaboration with Roger Penrose, dealt with Einstein's general theory of relativity, black holes, and gravity. The great success of "A Brief History of Time" surprised him. He followed it with a series of essays, "Black Holes and Baby Universes and Other Essays", in 1993 and with "The Universe in a Nutshell" in 2001.

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