

**Методическая разработка
открытого учебного занятия
по дисциплине «Иностранный язык в профессиональной
деятельности (английский)»**

**Тема: «Известные английские и русские ученые и изобретатели в
области электротехники».**

Методическая разработка открытого учебного занятия по дисциплине ОГСЭ.03 «Иностранный язык в профессиональной деятельности» Тема: «Известные английские и русские ученые и изобретатели в области электротехники». ЧЭНК, 2021. - 25 с.

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Данная методическая разработка открытого учебного занятия по теме «Известные английские ученые и изобретатели в области электротехники» иллюстрирует изучение темы в курсе дисциплины «Иностранный язык в профессиональной деятельности» для студентов технических специальностей; предназначена для преподавателей и является примером практического применения элементов игровых технологий. В разработке представлено полное методическое обеспечение учебного занятия по указанной теме.

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Введение

В соответствии с рабочей программой учебной дисциплины «Иностранный язык в профессиональной деятельности» тема «Известные английские ученые и изобретатели в области электротехники» обучающимися 2 курса изучается согласно КТП в 3 семестре. Номер занятия по КТП – 13, количество часов - 2.

Тип занятия: урок ознакомления с новым материалом.

Вид занятия: комбинированный урок.

Цель занятия:

Формирование у обучающихся умений читать, переводить и понимать тексты по изучаемой теме: «Известные английские и русские ученые и изобретатели в области электротехники»

Задачи занятия:

Образовательные:

- 1) Сформировать умение употреблять лексические единицы и грамматические конструкции по теме «Известные английские и русские ученые и изобретатели в области электротехники»;
- 2) Обеспечить понимание текстов по изучаемой теме

Развивающие:

- 1) Развивать логическое мышление, память;
- 2) Развивать умение работать в коллективе и индивидуально

Воспитательные:

- 1) Совершенствовать умение правильно понимать лексические единицы по теме
- 2) Совершенствовать умение правильно употреблять грамматические конструкции по теме
- 3) Совершенствовать монологическую речь с использованием информации из текста в качестве опоры

Практическая задача:

- 1) Совершенствовать умения использовать лексические единицы и грамматические конструкции в рамках темы: «Известные английские и русские ученые и изобретатели в области электротехники»

Образовательные ресурсы:

1. Агабекян, И.П. Английский язык. Учебное пособие для СПО [Текст]: учебник / И.П. Агабекян. – Москва: Феникс, 2019. – 319 с.
2. Evans, V. Career Paths: Electrician [Текст]: учебное пособие / Evans Virginia. – 3-е изд. – Express Publishing, 2017. – 39 с.
3. Галкина А. А. Английский язык для бакалавров электротехнических специальностей= Electricity and everything connected with it : учебное пособие/ А. А Галкина. – Ростов н/ Д : Феникс 2019. – 235 с. : ил. (Высшее образование)

Учебное оборудование: раздаточный материал.

Формы обучения:

Фронтальная и индивидуальная формы, работа в малых группах.

Методы обучения:

Объяснительно - иллюстративный метод, учебная дискуссия, самостоятельная работа с печатным текстом.

Формируемые ОК и ЗУ.

ОК 02, ОК 04, ОК 10

Уметь: рассказывать, рассуждать в связи с изученной тематикой проблематикой прочитанных, прослушанных текстов; описывать события, излагать факты, делать сообщения; понимать относительно полно (общий смысл) высказывания на изучаемом иностранном языке в различных ситуациях общения; читать аутентичные тексты разных стилей (научно – популярные, технические), используя основные виды чтения (ознакомительное, изучающее, просмотровое, поисковое) в зависимости от коммуникативной задачи.

Знать: значение новых лексических единиц, связанных с тематикой данного этапа; тексты, построенные на языковом материале общенаучной направленности; образование грамматических конструкций английского языка

Элементы СОТ: игровые технологии, работа в малых группах.

Особенности группы: студенты группы ЭССиС 2-20, уровень языковой компетенции – средний.

В результате учебного занятия обучающиеся смогут:

Знать

Значение новых лексических единиц, связанных с тематикой данного учебного занятия.

Уметь

- 1) рассказывать, рассуждать в связи с изученной тематикой проблематикой прочитанных, прослушанных текстов; описывать события, излагать факты, делать сообщения;
- 2) понимать относительно полно (общий смысл) высказывания на изучаемом иностранном языке в различных ситуациях общения; читать аутентичные тексты разных стилей (научно – популярные, технические), используя основные виды чтения (ознакомительное, изучающее, просмотровое, поисковое) в зависимости от коммуникативной задачи.

Ход учебного занятия:

1. Организационный этап – 5 мин.
2. Мобилизующий этап: ознакомление с темой урока, постановка целей и задач перед учащимися – 5 мин.
3. Актуализация опорных знаний по теме «Известные английские и русские ученые и изобретатели в области электротехники» – 15 мин.

4. Изучение нового материала работа с текстом по теме, выполнение послетекстовых заданий – 30 мин.
5. Первичное закрепление, совершенствование и контроль новых знаний и умений, выполнение теста – 25 мин.
6. Выставление оценок – 5 мин.
7. Рефлексия учебно - познавательной деятельности – 5 мин

Технологическая карта занятия

Этап занятия	Цель этапа	Содержание (деятельность преподавателя)	Формы организации работы (деятельность обучающихся)	Формируемые умения, знания, компетенции
1. Организационный этап: организация начала занятия.	Приветствие. Создание атмосферы урока. Проверка присутствующих.	Ведет диалог с дежурным. <ul style="list-style-type: none"> • Are all present? • Who is absent? • Why? • Who is late? • Why? • What date is it today? Write the date on the blackboard.	<u>Фронтальная работа.</u> Отвечают на вопросы преподавателя. Адаптируются к рабочему месту. Записывают число на доске и в тетради.	У 1
2. Мобилизующий этап: ознакомление с темой урока, постановка его целей и задач.	Формулирование темы урока. Определение цели и задач урока.	Формулирует тему занятия. Ставит учебные цели и задачи.	<u>Фронтальная работа.</u> Осмысливают поставленные преподавателем учебные цели.	У 1 ОК 02 ОК 04 ОК 10

3.Актуализация опорных знаний обучающихся по теме: «Известные ученые и изобретатели в области электротехники». Вопросно – ответная беседа.	Выявление уровня имеющихся знаний по теме «Известные ученые и изобретатели в области электротехники». Игра “Four Angles Game”	Студенты сопоставляют открытия ученых с именами ученых, совершивших открытия	<u>Групповая и индивидуальная работа.</u> Строят ответы на вопросы. Читают текст. Сопоставляют открытия ученых с именами ученых, совершивших открытия	У 1 ОК 02 ОК 04 ОК 10
4. Изучение нового материала по теме учебного занятия, запись в рабочих тетрадях перевода слов, отработка произношения. Работа с текстами по теме занятия выполнение перевода в группах. Составление пересказа текста и составление вопросов для первичного закрепления	Организация восприятия и осмысления, запоминания новых знаний по теме «Известные ученые и изобретатели». Совершенствование навыков устной и письменной речи: учить составлять аргументированное высказывание в рамках темы.	Выясняет, какие ЛЕ обучающиеся запомнили с прошлого занятия. Задаёт вопросы. Организует работу по развитию навыков устной речи. Организует работу с текстом в малых группах: - чтение и перевод в группах - составление вопросов. -составление пересказа текста Проверяет и корректирует в случае необходимости выполнение заданий.	<u>Групповая и индивидуальная работа.</u> Проговаривают новые ЛЕ. Слушают задание, читают текст, выполняют задания к тексту, делают записи в тетрадях.	У 1 ОК 02 ОК 04 ОК 10

новых лексических единиц.				
5. Закрепление изученного материала: первичный контроль, викторина	Контроль усвоения обучающимися новых ЛЕ.	Организует первичный контроль усвоения нового лексического материала. Организует выполнение теста в рамках темы учебного занятия. Организует студентов на участие в викторине	<u>Индивидуальная и парная работа.</u> Прослушивают инструкцию по выполнению задания и выполняют его. Участвуют в викторине.	У 1 ОК 02 ОК 04 ОК 10
6. Выставление оценок.	Оценки за урок.	Выставляет отметки, дает им комментарий.	Проверяют тесты друг у друга. Оценивают свои работы и работы участников своей группы Говорят оценки преподавателю	У 1 ОК 02 ОК 04 ОК 10
7. Рефлексия учебно-познавательной деятельности	Провести рефлексию	Организует рефлексию.	Делают самоанализ изученного материала, заканчивают предложения: Я узнал... Я научился... Было сложно... Было интересно...	

Конспект учебного занятия

1. **Организационный момент.** Hello dear students, guests Let's call the roll. So everybody is here let's begin our lesson.

2. **Мобилизующий этап:** ознакомление с темой урока, постановка целей и задач перед учащимися

First of all I'll ask you to group some words into three groups. So first group will be **science**: physics, chemistry, electronics, technology, electrochemistry, periodic table

The second group **scientist**: Faraday, Mendeleev, Newton, Maxwell, Bell, Volta,

The third group will be **inventions**: liquefying gases under pressure, molecular structure, electromagnetic waves, electrical battery, telephone, electricity, periodic table.

How do you think what will we talk about today? Ok. Right you are we will talk about scientists and their inventions. Let's play .

3. **Актуализация опорных знаний по теме «Известные английские и русские ученые и изобретатели в области электротехники »**

“Four Angles Game”

You have to decide which sphere () was he famous in and tell what you know about this person and what made him famous (*students watch presentation and match right column with the left one*)

Isaac Newton He discovered the law of gravity when an apple fell on his head.

Michael Faraday He worked in the fields of electromagnetism and electrochemistry

Alexander Fleming This brave scientist discovered penicillin.

Alessandro Volta He invented electric battery in 1800

Copernicus he was the first man to explain correctly our Solar System.

Mikhail Lomonosov is the father of the Russian science, an outstanding poet, the founder of Russian literature, a historian & a statesman.

Dmitri Ivanovitch Mendeleev is the outstanding Russian chemist. His greatest discovery was the periodic law of chemical elements.

Albert Einstein invented the theory of relativity

4. **Изучение нового материала работа с текстом по теме, выполнение послетекстовых заданий**

Let's divide into four groups. I'll give a text for each group. Texts are different. Your task will be: read the texts and ask some questions. Then one student of each group will retell us what text is about in your group. I will give you 30 minutes to do the tasks. Then someone from each group will retell the texts and we will ask and answer questions in your group orally.

Преподаватель раздает обучающимся тексты и просит их прочитать в группе и задать вопросы к тексту. Тексты об ученых и их изобретениях: о Джеймсе Максвелл, о Майкле Фарадее, Дмитрие Менделееве, Исааке Ньютоне.(Приложение 1 – 4) По одному студенту от каждой группы рассказывают о чем текст в их группе. Студенты задают вопросы друг другу в группе и отвечают на них (30 минут)

5. **Первичное закрепление, совершенствование и контроль новых знаний и умений, выполнение теста**

Then the teacher checks the tasks. If there are some mistakes the teacher corrects them. Teacher gives tests for each group and students do the tests. After the tests are written students exchange the tests and check them. For doing this task students have 20 minutes.

Затем преподаватель проверяет выполнение задания, если есть ошибки они исправляются. Студенты получают тесты, соответствующие тексту и выполняют их. После выполнения студенты обмениваются тестами и проверяют их, ставят оценки.(10 мин)

Tasks for the groups:

Пройти тест по итогам теста поставить оценки друг другу:

Test 1

1. What decade did Maxwell formulate his classical theory?
 - a. 1850 – 1860
 - b. 1870 – 1880
 - c. 1860 – 1870
2. Where ultraviolet rays are used nowadays?
 - a. Radio
 - b. Television
 - c. Furnace
3. What modern device was developed to send out and receive the echoes?
 - a. Television
 - b. Radar
 - c. Radio
4. What device helped to warn of enemy planes?
 - a. Radar
 - b. Radio
 - c. Internet
5. What physical phenomenon can be transmitted with the help of electromagnetic waves at a distance?
 - a. Picture
 - b. Sound
 - c. Heat
6. What scientist had proved the existence of electromagnetic waves?
 - a. Maxwell
 - b. Hens
 - c. Faraday
7. What name had the theory did Maxwell formulated?
 - a. Ultraviolet rays
 - b. Electromagnetic theory
 - c. Electromagnetism

Answers Test 1 Maxwell:

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

Test 2 .

1. How many children were in Faraday's family?
 - a. 10
 - b. 8
 - c. 5
2. What was the first stroke of luck for Faraday?
 - a. He could read books there
 - b. He could do everything he wanted
 - c. He could not attend scientific lectures
3. What was second job for Faraday?
 - a. Bookbinder
 - b. Secretary
 - c. Scientist
4. What was Faraday's first mark in chemistry?
 - a. Liquefying gases
 - b. He discovered benzene
 - c. Discovering the faraday's law
5. What was Faraday's contribution to electrochemistry?
 - a. Transformer
 - b. Liquefying gases under pressure
 - c. Faraday's laws of electrolysis
6. Was Faraday honored to be a knighthood?
 - a. He agreed to be a knighthood
 - b. He declined to be knighthood
 - c. He didn't honored to be a knighthood
7. Was any unit named after Faraday?
 - a. Ampere
 - b. Volt
 - c. Farad

Answers Test 2 Faraday:

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

Test 3.

1. British scientists invented _____ way of multiplying and dividing.
 - a. mechanical;
 - b. electrical;
 - c. optical
2. A new branch of mathematics _____ was invented in England and Germany independently.

- a. mechanics;
 - b. arithmetic;
 - c. calculus
3. Where did Newton go to get further education after graduation?
- a. at Oxford University
 - b. University of Manchester
 - c. at Cambridge University
4. What is an optical device invented by I. Newton?
- a. Astrolabe
 - b. Reflecting telescope
 - c. Sleepover pipe
5. Newton believed that light is...
- a. Electromagnetic wave
 - b. Particle flow
 - c. Photon flux
6. In what scientific field didn't Newton make any discoveries?
- a. Astronomy
 - b. Biology
 - c. Physics
7. What Newton's law is called the "law of inertia"?
- a. Newton's first law
 - b. Newton's third law
 - c. Law of gravity

Answers Test 3 Newton:

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

Test 4.

1. Where occurred the main event that led Mendeleev to the discovery of the relations between **atomic weights** and chemical properties?
- a. the Karlsruhe congress
 - b. the Brussels congress
 - c. the Paris congress

2. When did Mendeleev define the “absolute point of ebullition”?
 - a. 1870
 - b. 1895
 - c. 1860
3. When did Mendeleev the final volume of the first edition of his *Principles of Chemistry*?
 - a. 1880
 - b. 1871
 - c. 1867
4. When did he study the thermal expansion of liquids?
 - a. 1860s
 - b. 1910s
 - c. 1880s
5. What research program did Mendeleev focus on throughout his career?
 - a. Atomic weights
 - b. Discovery of electrons
 - c. Gases and liquids
6. When electrons and radioactivity was discovered?
 - a. In 1870s
 - b. In 1865
 - c. In 1890s
7. What law made Mendeleev famous?
 - a. Periodic law
 - b. Avogadro's Law
 - c. Dalton'slaw

Answers Test 4 Mendeleev:

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

Викторина. Преподаватель предлагает поучаствовать в викторине

Ok. Before checking I suggest you to participate in quiz Everybody are to participate, The winners will have excellent marks without checking the test.

Inventive round

1. Who invented the phone? (Alexander Graham Bell).
2. What medicine was discovered by the English scientist Alexander Fleming? (penicillin.)
3. What English scientist discovered the law of physics? (Newton.)
4. What English scientist wrote evolutionary theory of human origin. (Charles Darwin).
5. What British scientist came up with the idea of wave-like propagation of light (Robert Hooke.)
6. **Выставление оценок** And now let's check the tests and let us know your results for today's lesson.

And now it's high time for bell. Let's sum up your marks for lesson. Пора заканчивать наш урок. Давайте посчитаем баллы и подведем итоги урока

7. Рефлексия учебно-познавательной деятельности

Ок, it's time to sum up. You have worked hard today tell me please. Подведем итоги урока Вы хорошенько поработали сегодня. Ответьте на вопросы:

Did you like today's lesson?

Were the exercises easy or difficult for you?

Was the lesson interesting?

Thank you for your hard working. I'll see you next week. Bye

James Maxwell

In the decade 1860 – 1870 James Maxwell formulated his classical electromagnetic theory. He showed that light was a form of wave motion travelling with a speed dependent on the electric and magnetic properties of the medium through which it transmitted; he also predicted that waves longer than those of light could exist.

Even before Maxwell advanced the theory that electromagnetic waves could, men were making use of them for other purposes besides vision. For instance, the short ultraviolet rays in sunlight provides suntans; and the heat of the sun – provided by the long infra – red rays – was often considered by means of lens to start fires. After the existence of electromagnetic waves had been proved by Hertz it was discovered that they range in length from hundreds of miles down to less than a billionth of an inch. The long waves could be used to carry sounds through space; as a consequence radio was developed.

A more recent development, which is related to radio, is television. Not only sounds but pictures can be transmitted at a distance because of electromagnetic waves.

Another modern device, developed to send out electromagnetic waves and to receive the echoes when they return, is radar, since the speed of electromagnetic waves is known, the time it takes for an echo to return to the radar set can tell the operator how far away plain is from his set. Radar is given the credit for saving Great Britain during World War II, for it warned of enemy planes. Thus James Maxwell had made discoveries that later protected his homeland. Today with radio, television, radar and communication with outer space making use of these waves it is easy to realize why James Maxwell is now considered one of the great scientists of all time.

1. What is James Maxwell famous for?
2. What theory was advanced by Maxwell?
3. What can be transmitted with help of electromagnetic waves?
4. What modern devices use electromagnetic waves? For what are these devices used?
5. Where were men using electromagnetic waves before Maxwell's theory?

Test 1

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 - c. 1860 – 1870
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6. What scientist had proved the existence of electromagnetic waves?
 - a. Maxwell
 - b. Hens
 - c. Faraday
7. What name had the theory did Maxwell formulated?
 - a. Ultraviolet rays
 - b. Electromagnetic theory
 - c. Electromagnetism

Answers Test 1 Maxwell:

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

Michael Faraday.

Faraday (1791 – 1867) was one of the ten children of blacksmith, who moved with his family to London. It is a rare laboring family with ten children that is rich, so there was no question of an education for young Faraday and he was apprenticed to a bookbinder.

This, as it happened, the stroke of luck, for he could read books there. Faraday's second stroke of luck was that his employer was sympathetic to the young man's desire for learning and allowed him to read books and attend scientific lectures.

In 1812 a customer gave Faraday tickets to attend the lectures of Humphry Davy at the Royal Institution. Young Faraday took careful notes which he further elaborated with coloured diagrams and these he sent to the president of the Royal Society in the hope of getting a job that would bring him into closer contact with science. Getting no answer he sent others to Davy himself along with an application for a job as his assistant. Davy was enormously impressed by clear ability of youngster. He offered the young man the job. Faraday took it in 1813, at the age of twenty –two – at the salary that was smaller than the one he had been earning as a bookbinder. Almost at once Davy left for his grand tour of Europe and took Faraday with him as a secretary.

Faraday became director of laboratory in 1825 and in 1833 the one – time bookbinder became professor of chemistry at the Royal Institution.

In chemistry Faraday made his first mark in 1823 when he devised methods for liquefying gases under pressure. He was the first to produce temperatures in the laboratory that were below the zero mark of the Fahrenheit scale. He may just be viewed as a pioneer in the modern branch of physics called cryogenics (study of extreme cold).

In 1825 occurred his greatest contribution on organic chemistry. He discovered benzene, a compound that was a key role in the development of means of representing molecular structure.

In 1833 -1834 Faraday further reduced the matter of electrolysis to quantitative terms by announcing what are now called Faraday's laws of electrolysis. Faraday's laws put electrochemistry on its modern basis. In his honor the quantity electricity required to liberate 23 grams of sodium, or 108 grams of silver or 32 grams of copper (that is to liberate an "equivalent weight" of an element) is called farad. Also, the unit electrostatic capacitance is farad, in his honor.

In later years Faraday made more discoveries in connection with electromagnetism and its interaction with light.

When he was eventually offered the presidency of the Society by Tyndall, however, he declined it and he also declined an offer of knighthood. He was intent on being plain Michael Faraday.

1. In what family was Faraday born?
2. What was his first job?
3. What was his second job?
4. How did he manage to get it? What was his first mark in chemistry?
5. What was his contribution to organic chemistry?

Test 2

1. How many children were in Faraday's family?
 - a. 10
 - b. 8
 - c. 5
2. What was the first stroke of luck for Faraday?
 - a. He could read books there
 - b. He could do everything he wanted
 - c. He could not attend scientific lectures
3. What was second job for Faraday?
 - a. Bookbinder
 - b. Secretary
 - c. Scientist
4. What was Faraday's first mark in chemistry?
 - a. Liquefying gases
 - b. He discovered benzene
 - c. Discovering the faraday's law
5. What was Faraday's contribution to electrochemistry?
 - a. Transformer
 - b. Liquefying gases under pressure
 - c. Faraday's laws of electrolysis
6. Was Faraday honored to be a knighthood?
 - a. He agreed to be a knighthood
 - b. He declined to be knighthood
 - c. He didn't honored to be a knighthood
7. Was any unit named after Faraday?
 - a. Ampere
 - b. Volt
 - c. Farad

Answers Test 2 Faraday:

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

Isaac Newton

Isaac Newton was one of the great figures in the history of science. His ideas about motion and gravity are fundamental to the science of [physics](#) and other fields. Newton also shares credit with [Gottfried Wilhelm Leibniz](#) of Germany for independently developing [calculus](#) in the 17th century.

Newton was the original developer of calculus, an advanced branch of mathematics that deals mostly with rates of change and with problems such as determining areas or volumes within curved lines or surfaces. Another mathematician, Gottfried Wilhelm Leibniz of Germany, who was a contemporary of Newton, independently developed the idea of calculus. It is now well established that Newton developed calculus before Leibniz seriously pursued mathematics. However, it was Leibniz's paper in 1684 that first made calculus a matter of public knowledge. Calculus is now the basic entry point for anyone wishing to study physics, chemistry, biology, economics, or finance..

Newton started his research into [optics](#), or the study of sight and the behavior of light, when he was a university student. Using a [prism](#) with light in a series of experiments, he studied the [spectrum](#) of light projected onto a wall. His analysis pointed to the existence of individual rays of light that refract at different angles, which results in phenomena such as rainbows. Believing that [chromatic aberration](#), or color distortion, would always be present in glass lenses, he built the first ever [reflecting telescope](#). His improved reflecting telescope and his theory of colors impressed the [Royal Society](#) in 1671–72. Newton later published his analysis in the book *Opticks*. His observations of the fundamental nature of light have been foundational in modern science.

Newton analyzed both planetary motion and universal gravitation. He proposed that planetary orbits are mostly elliptical because of the Sun's gravitation. In 1684 British astronomer [Edmond Halley](#) visited Newton with questions about orbital dynamics. Newton collected his findings for Halley in a tract called *De Motu* ("On Motion"), which he then started to improve and expand. It grew into *Philosophiae Naturalis Principia Mathematica* (*The Mathematical Principles of Natural Philosophy*), which is the fundamental work for the whole of modern science. The *Principia* contains the [law of universal gravitation](#) and the three [Newtonian laws of motion](#). The law of universal gravitation states that every particle of matter in the universe attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between their centers. The first Newtonian law of motion is the principle of [inertia](#), stating a body continues in its state of rest or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed upon it. The second law states that the change of motion of an object is proportional to the force impressed and is made in the direction of the straight line in which the force is impressed. The third law states that to every action there is an equal and opposite reaction. These principles are the groundwork for all modern understanding of movement and physics.

1. What is Newton famous for?
2. What is his contribution to physics?
3. Does Newton's theory influenced modern science?
4. What Newtonian laws do you know?
5. Why did Newton propose that planetary orbits are mostly elliptical?

Test 3.

1. British scientists invented _____ way of multiplying and dividing.
 - a. mechanical;
 - b. electrical;
 - c. optical
2. A new branch of mathematics _____ was invented in England and Germany independently.
 - a. mechanics;
 - b. arithmetic;
 - c. calculus
3. Where did Newton go to get further education after graduation?
 - a. at Oxford University
 - b. University of Manchester
 - c. at Cambridge University
4. What is an optical device invented by I. Newton?
 - a. Astrolabe
 - b. Reflecting telescope
 - c. Sleepover pipe
5. Newton believed that light is...
 - a. Electromagnetic wave
 - b. Particle flow
 - c. Photon flux
6. In what scientific field didn't Newton make any discoveries?
 - a. Astronomy
 - b. Biology
 - c. Physics
7. What Newton's law is called the "law of inertia"?
 - a. Newton's first law
 - b. Newton's third law
 - c. Law of gravity

Answers Test 3 Newton:

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

Dmitri Mendeleev

Since Mendeleev is best known today as the discoverer of the [periodic law](#), his chemical career is often viewed as a long process of maturation of his main discovery. Indeed, in the three decades following his discovery, Mendeleev himself offered many recollections suggesting that there had been a remarkable [continuity](#) in his career, from his early dissertations on isomorphism and specific volumes (for graduation and his master's degree), which involved the study of the relations between various properties of chemical substances, to the periodic law itself. In this account, Mendeleev mentioned the Karlsruhe congress as the major event that led him to the discovery of the relations between [atomic weights](#) and chemical properties.

However, this retrospective impression of a continuous research program is misleading, since one striking feature of Mendeleev's long career is the [diversity](#) of his activities. First, in the field of chemical [science](#), Mendeleev made various contributions. In the field of [physical chemistry](#), for instance, he conducted a broad research program throughout his career that focused on [gases](#) and [liquids](#). In 1860, while working in [Heidelberg](#), he defined the "absolute point of ebullition" (the point at which a gas in a container will [condense](#) to a liquid solely by the application of [pressure](#)). In 1864 he formulated a theory (subsequently discredited) that [solutions](#) are chemical combinations in fixed proportions. In 1871, as he published the final volume of the first edition of his *Principles of Chemistry*, he was investigating the elasticity of gases and gave a formula for their deviation from [Boyle's law](#), the principle that the volume of a gas varies inversely with its pressure. In the 1880s he studied the [thermal expansion](#) of liquids.

A second major feature of Mendeleev's scientific work is his theoretical inclinations. From the beginning of his career, he continually sought to shape a broad theoretical scheme in the tradition of natural philosophy. This effort can be seen in his early adoption of the type theory of the French chemist [Charles Gerhardt](#) and in his rejection of electrochemical dualism as suggested by the great Swedish chemist [Jöns Jacob Berzelius](#). All his efforts were not equally successful. He based his 1861 organic chemistry textbook on a "theory of limits" (that the percentage of [oxygen](#), [hydrogen](#), and [nitrogen](#) could not exceed certain amounts in combination with [carbon](#)), and he defended this theory against the more popular structural theory of his countryman [Aleksandr Butlerov](#). Because of his [antipathy](#) to electrochemistry, he later opposed the Swedish chemist [Svante Arrhenius](#)'s ionic theory of solutions. Before and during Mendeleev's time, many attempts at classifying the elements were based on the [hypothesis](#) of the English chemist [William Prout](#) that all elements derived from a unique primary matter. Mendeleev insisted that elements were true individuals, and he fought against those who, like the British scientist [William Crookes](#), used his periodic system in support of Prout's hypothesis. With the discovery of [electrons](#) and [radioactivity](#) in the 1890s, Mendeleev perceived a threat to his theory of the individuality of elements. In *Popytka khimicheskogo ponimania mirovogo efira* (1902; *An Attempt Towards a Chemical Conception of the Ether*), he explained these phenomena as movements of [ether](#) around heavy atoms, and he tried to classify [ether](#) as a [chemical element](#) above the [group](#) of inert gases (or [noble gases](#)). This bold (and ultimately discredited) hypothesis was part of Mendeleev's project of extending Newton's mechanics to chemistry in an attempt to unify the natural sciences.

1. What is Mendeleev's contribution to chemistry?
2. What law made him famous?
3. Did he influence on science?
4. When did Mendeleev base his organic chemistry textbook?

5. How did he classify movements of gases?

Test 4.

1. Where occurred the main event that led Mendeleev to the discovery of the relations between **atomic weights** and chemical properties?
 - a. the Karlsruhe congress
 - b. the Brussels congress
 - c. the Paris congress
2. When did Mendeleev define the “absolute point of ebullition”?
 - a. 1870
 - b. 1895
 - c. 1860
3. When did Mendeleev the final volume of the first edition of his *Principles of Chemistry*?
 - a. 1880
 - b. 1871
 - c. 1867
4. When did he study the thermal expansion of liquids?
 - a. 1860s
 - b. 1910s
 - c. 1880s
5. What research program did Mendeleev focus on throughout his career?
 - a. Atomic weights
 - b. Discovery of electrons
 - c. Gases and liquids
6. When electrons and radioactivity was discovered?
 - a. In 1870s
 - b. In 1865
 - c. In 1890s
7. What law made Mendeleev famous?
 - a. Periodic law
 - b. Avogadro's Law
 - c. Dalton'slaw

Answers Test 4 Mendeleev:

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

Название текста _____

	Фамилия студента	Составление вопросов к тексту	Составление пересказа	Решение теста	Итого
1					
2					
3					
4					
5					

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1					
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