МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ
УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«СЕВЕРО-КАВКАЗСКИЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»

Методические указания

по выполнению практических работ по дисциплине
«Иностранный язык в сфере профессиональной коммуникации»
для студентов направления подготовки
01.04.02 Прикладная математика и информатика

Ставрополь, 2026

Содержание

ВВЕДЕНИЕ

Изменение системы высшего образования требует разработки принципиально новых подходов к обучению в целом. Обучение иностранному языку было и остается составной частью формирования бакалавра. Вузовский курс иностранного языка носит коммуникативно-ориентированный и профессионально-направленный характер.

Настоящее учебно-методическое пособие "Иностранный язык (английский язык) в сфере профессиональной коммуникации" предназначено для студентов 1 курса, обучающихся по направлению подготовки 01.04.02 «Прикладная математика и информатика»

Направленность (профиль): «Математическое моделирование»Учебно-методическое пособие ориентировано на студентов, владеющих английским языком в объеме программы бакалавриата.

Дисциплина «Иностранный язык в сфере профессиональной коммуникации» имеет практико-ориентированный характер и построена с учетом междисциплинарных связей, в первую очередь, знаний, навыков и умений, приобретаемых студентами в процессе изучения социальных дисциплин и дисциплин профессионального цикла.

Цель курса – повышение исходного уровня владения иностранным языком, достигнутого на предыдущей ступени образования, и овладение студентами необходимым и достаточным уровнем коммуникативной компетенции для решения социально-коммуникативных задач в различных областях бытовой, культурной, профессиональной и научной деятельности при общении с зарубежными партнерами, а также для дальнейшего самообразования. Изучение иностранного языка призвано также обеспечить: повышение уровня учебной автономии способности к самообразованию; развитие когнитивных и исследовательских умений; развитие информационной культуры; расширение кругозора и повышение общей культуры студентов; воспитание толерантности и уважения к духовным ценностям разных стран и народов.

Задачи:

- определить особенности функционирования фонетических, лексико-грамматических, стилистических и социокультурных норм родного и иностранного языков в разных сферах речевой коммуникации;
- формировать у студентов необходимые навыки профессионального общения на иностранном языке;
- научить обучаемых анализировать, обобщать и осуществлять отбор информации на языковом и культурном уровнях с целью обеспечения успешности процесса восприятия, выражения и воздействия в межкультурном и социальном общении.

В результате освоения дисциплины «Иностранный язык» (английский язык) у выпускника формируются универсальные компетенции:

УК-4

Знать:

– словообразовательную структуру общенаучного и терминологического слоя

текста по специализации, лексику делового, национально-культурного общения;
лексический минимум иностранного языка общего и профессионального характера;
Уметь:
– работать с профессиональной литературой на иностранном языке в печатном и электронном виде, т.е. овладеть всеми видами чтения (просмотрового, ознакомительного, изучающего, поискового);
общаться с зарубежными коллегами на одном из иностранных языков, осуществлять перевод профессиональных текстов
Владеть:
– – навыками профессионально-ориентированного перевода текстов, относящихся к различным видам основной профессиональной деятельности.
- культурой иноязычной устной и письменной речи.
УК-5
Знать:
– грамматические основы иностранного языка, обеспечивающие коммуникацию общего и профессионального характера без искажения смысла при письменном и устном общении;
– фонетические, грамматические и лексические структуры устной и письменной речи в определенном объеме;
Уметь:
– общаться с зарубежными коллегами на одном из иностранных языков, осуществлять перевод профессиональных текстов;
Владеть:
– навыками разговорной речи на одном из иностранных языков и профессионально-ориентированного перевода текстов, относящихся к различным видам основной профессиональной деятельности.
Промежуточный контроль
В течение семестра имеет место промежуточный контроль, который осуществляется 3 раза в семестр в форме мидтермов, проводимых в конце каждого месяца и состоящих из:
- лексико-грамматический тест (60 пунктов, время выполнения - 80 мин.). Включает задания на проверку текущего лексического и грамматического материала.
- тест по чтению (15 пунктов, время выполнения - 60 мин.) Проверяет умение студента понять общее содержание, некоторые детали и структуру текста.
- коллоквиум (15 пунктов для обсуждения – 80 мин.). Включает темы и вопросы, пройденные за месяц.
- эссе в форме рассуждения. (Объем - 150 слов, время выполнения - 80 мин.) Определяет умение студента развернуто излагать свою мысль на английском языке.
- вопросы, пройденные за месяц.

- эссе в форме рассуждения. (Объем - 150 слов, время выполнения - 80 мин.) Определяет умение студента развернуто излагать свою мысль на английском языке.

  Содержание обучения

  The Real-Number System. The Field and the Order Axioms. Rational and Irrational Numbers. Signed Numbers. Types of Fractions. Addition and Subtraction. Multiplication and Division. Natural Numbers. What are Imaginary Numbers? Numbers and Fundamental Arithmetical Operations. Counting and Numbers. Calculus.

Трудоемкость, з.е.	6
Формы отчетности	2 семестр – экзамен

UNIT 1

NUMBERS

Цель занятия: развитие лексических навыков; повторение грамматического материала; развитие и совершенствование навыков работы по тексту со словарем.

Организационная форма занятия: комбинированное практическое занятие.

Задачи занятия: Ознакомление с новой лексикой по теме; развитие и совершенствование навыков чтения текста с целью детального понимания содержания.

BASIC TERMINOLOGY
9658 – ABSTRUCT NUMBER **– отвлеченное число** **- A FOUR – FIGURE NUMBER –** четырехзначное число **9 – thousands** – тысячи **6 – hundreds** – сотни **5 – tens** – десятки **8 – units** – единицы **5 KG. – CONCRETE NUMBER –** именованное число
2 - CARDINAL NUMBER – **количественное число** 2^{nd} - ORDINAL NUMBER – **порядковое число**
+ 5 - POSITIVE NUMBER – положительное число **- 5 - NEGATIVE NUMBER** – отрицательное число
a, b, c… - ALGEBRAIC SYMBOLS – алгебраические символы
3 1/3 - MIXED NUMBER – смешанное число **3 - WHOLE NUMBER (INTEGER) –** целое число **1/3 - FRACTION –** дробь
2, 4, 6, 8 - EVEN NUMBERS – четные числа **1, 3, 5, 7 - ODD NUMBERS** – нечетные числа **2, 3, 5, 7 - PRIME NUMBERS** – простые числа
3 + 2 – 1 - COMPLEX NUMBER – комплексное число **3 - REAL PART** – действительное число **2-1 - IMAGINARY PART** – мнимая часть
2/3 - PROPER FRACTION – правильная дробь **2 - NUMERATOR** – числитель **3 - DENOMINATOR –** знаменатель **3/2 - IMPRORER FRACTION** – неправильная дробь

ACTIVE VOCABULARY OF TEXT 1

to assume	предполагать
completeness axiom	аксиома завершенности
concept	понятие, концепт
to contain	содержать
convenience	удобство
to fall (fell, fallen) (into)	подразделяться, распадаться на
field axiom	аксиома поля
to indicate	указывать
integer	целое число
to introduce	вводить
irrational	иррациональный
mathematical analysis	математический анализ
nonempty	непустой
notation	система записи
order axiom	аксиома порядка
property	свойство
rational	рациональный
real number	действительное число
to refer (to)	ссылаться на
quotient	частное
to satisfy	удовлетворять
set	множество
subset	подмножество
undefined	неопределенный

TEXT 1

INTRODUCTION TO THE REAL - NUMBER SYSTEM

Mathematical analysis studies **concepts** related in some way to **real numbers,** so we begin our study of analysis with the real number system.

Several methods are used to introduce real numbers. One method starts with the positive **integers 1, 2, 3… as undefined** concepts and uses them to build a larger system, the positive rational numbers (quotients of positive integers), their negatives, and zero. **The rational numbers,** in turn, are then used to construct **the irrational numbers,** real numbers like √2 and π, which are not rational. The rational and irrational numbers together constitute the real number system.

Although these matters are an important part of the foundations of mathematics, they will not be described in detail here. As **a matter of fact,** in most phases of analysis it is only the **properties** of real numbers that concerns us, rather than the methods used to construct them.

For convenience, we use some elementary set **notation and terminology.** Let **S** denote a set (a collection of objects). The notation $\mathbf{x} \in \mathbf{S}$ means that the object **x** is in the set, and we write $\mathbf{x} \notin \mathbf{S}$ to indicate that **x** is not in **S.**

A set **S** is said to be **a subset** of **T**, and we write $\mathbf{S} \subseteq \mathbf{T}$, if every object in **S** is also in **T**. A set is called nonempty if it **contains** at least one object.

We **assume** there exists a nonempty set **R** of objects, called real numbers, which **satisfy** ten axioms. The axioms **fall** in a natural way into three groups, which we refer as the **field axioms, order axioms, completeness axioms** (also called the upper-bound axioms or the axioms of continuity).

NOTE!	$\mathbf{X} \in \mathbf{S}$ is read "**x** belongs to **S**"
	$\mathbf{x} \notin \mathbf{S}$ is read "**x** doesn't belong to **S**"
	$\mathbf{S} \subseteq \mathbf{T}$ is read "**S** is a subset of **T** "
	$\sqrt{\mathbf{2}}$ is read "the square root of two"
	π is read "pi" [pai]

EXERCISES

I. Pronounce the words correctly:

analysis, related, mathematical, integer, method, undefined, although, foundation, described, object, notation, terminology, at least, assume, completeness, natural, refer, constitute, certain, convenience, elementary, property, matter of fact, axiom, field, order, completeness, group, refer, concept, quotient

II.Revise the four forms of the following verbs. Say which of them are regular and which - irregular ones:

to study, to relate, to begin, to use, to define, to construct, to describe, to denote, to mean, to say, to exist, to fall, to call, to satisfy.

III. Change the following sentences from the Active Voice into the Passive Voice

1. We study mathematical analysis.
2. We use these numbers in algebra.
3. We won't use negative numbers in arithmetic.
4. They will describe this system in the 4^{th} chapter.
5. We'll begin our study with some concepts.
6. S denotes a collection of objects.
7. We'll construct irrational numbers with the help of rational numbers.

IV. Read and translate the following sentences into Russian paying special attention to the used grammar forms

1. This science studies concepts related in some way to real numbers.
2. These methods are used to introduce real numbers.
3. The rational and irrational numbers constitute this number system.
4. We shall take these numbers as undefined objects satisfying certain axioms.
5. A set **S** is said to be a subset of **T**.

V. Give the Russian equivalents of the following English words and word combinations:

1. notation;
2. real numbers;
3. real - number system;
4. integer;
5. a rational number;
6. an irrational number;
7. a positive number;
8. a negative number;
9. a quotient;
10. a concept;
11. a set;
12. a subset;
13. a nonempty set;
14. an object;
15. zero;
16. a square root;

VI. Give the English equivalents of the following words and word combinations

Система действительных чисел, неопределенное понятие, непустое множество, система обозначения множества, рациональные числа, иррациональные числа, положительные числа, отрицательные числа, математический анализ.

VII. Given certain definitions. Your task is to determine what notion is defined. Follow the pattern

Pattern: A fraction whose numerator is greater then denominator. It is an improper fraction.

1) a number that is less than zero;
2) a number that is greater than zero;
3) a positive and a negative whole number;
4) a number that consists of a whole part and a fractional part;
5) a fraction whose numerator is less than denominator;
6) a number that is neither negative nor positive;
7) letters (a, b, c ...) which are used in algebra;
8) the system which is constituted by rational and irrational numbers;
9) a collection of objects.

VIII. General understanding.

1. What does mathematical analysis study?
2. What numbers are used to construct the irrational numbers?
3. What numbers constitute the real - number system?
4. What set is called the set of real numbers?

5. How many groups do axioms, which are satisfied by natural numbers, fall into?

6. What is a nonempty set? Give the examples of nonempty sets in everyday life.

7. When can a set be a subset of another set?

8. What does a notation $\mathbf{x \in S}$ mean?

IX. Translate the sentences into English

1. В этой системе используются положительные и отрицательные числа.

2. Положительные и отрицательные числа представлены (to represent) отношениями целых положительных чисел.

3. Рациональные числа, в свою очередь, используются для создания иррациональных чисел.

4. В совокупности рациональные и иррациональные числа составляют систему действительных чисел.

5. Математический анализ – это раздел математики, изучающий функции и пределы.

6. Множество X является подмножеством другого множества Y в том случае, если все элементы множества X одновременно являются элементами множества Y.

7. Аксиомы, удовлетворяющие множеству действительных чисел, можно условно разделить на три категории.

X. Translate the text into English

Для введения действительных чисел в математике применяется несколько методов. Один метод заключается в употреблении положительных целых чисел, таких, как 1, 2, 3 ... в виде неопределенных понятий, они используются, для построения большей системы, а именно системы положительных целых чисел (частных положительных целых), их отрицательных значений и нуля. В свою очередь, рациональные числа используются затем для создания системы действительных чисел, не являющихся рациональными, таких, как $\sqrt{2}$ или π. Системы рациональных и иррациональных чисел вместе составляют систему действительных чисел.

XI. Translate the definitions of the following mathematical terms:

1. mathematics - the group of sciences (including arithmetic, geometry, algebra, calculus, etc.) dealing with quantities, magnitudes, and forms, and their relationships, attributes, etc., by the use of numbers and symbols;

2. negative - designating a quantity less than zero or one to be subtracted;

3. positive - designating a quantity greater than zero or one to be added;

4. irrational - designating a real number not expressible as an integer or as a quotient of two integers;

5. rational - designating a number or a quantity expressible as a quotient of two integers, one of which may be unity;

6. integer - any positive or negative number or zero: distinguished from fraction;

7. quotient - the result obtained when one number is divided by an other number;

8. subset - a mathematical set containing some or all of the elements of a given set

9. field - a set of numbers or other algebraic elements for which arithmetic operations (except for division by zero) are defined in a consistent manner to yield another element of a set.

10.order- a) an established sequence of numbers, letters, events, units,

b) a whole number describing the degree or stage of complexity of an algebraic expression;

c) the number of elements in a given group.

(From Webster's New World Dictionary).

XII. Match the terms from the left column and the definitions from the right column:

negative	Designating a number or a quantity expressible as a quotient of two integers, one of which may be unity
positive	a set of numbers or other algebraic elements for which arithmetic operations (except for division by zero") are defined in a consistent
rational	designating a quantity greater than zero or one to be added
Irrational	the number of elements in a given group
order	designating a real number not expressible as an integer or as a quotient of two integers
quotient	a mathematical set containing some or all of the elements of a given set
subset	a quantity less than zero or one, to be subtracted
field	any positive or negative number or zero: distinguished from fraction
order	the result obtained when one number is divided by another number

XIII. Discussing problem “Introduction to the real-number system”.

ACTIVE VOCABULARY OF TEXT 2

addition	сложение
associative	ассоциативный
commutative	коммутативный
to derive	выводить, получать, извлекать (о знании)
distributive	дистрибутивный
to establish	установить
to exist	существовать
independent	независимый
inequality	неравенство
multiplication	умножение
negative	отрицательный
nonnegative	неотрицательный *(положительный или равный нулю)*
positive	положительный
product	произведение
reciprocal	обратная величина
relation	отношение
simultaneous	одновременный
statement	утверждение
sum	сумма
symbolism	система символов

TEXT 2

THE FIELD AND THE ORDER AXIOMS

Along with the set **R** of real numbers one can assume the existence of two operations, called **addition and multiplication,** such that for every pair of real numbers x and y the **sum** $x+y$ and the **product** xy are real numbers uniquely determined by x and y satisfying the following axioms. (In the axioms that appear below x, y, z represent arbitrary real numbers unless something is said to the contrary.):

Axiom 1. $x + y = y + x$, $xy = yx$. (**commutative** law).

Axiom 2. $x + (y + z) = (x + y) + z$, $x(yz) = (xy)z$ (**associative** law).

Axiom 3. $x(y + z) = xy + xz$ (**distributive** law).

Axiom 4. Given any two real numbers x and y, there exists a real number z such that $x + z = y$. This z is denoted by $y – z$; the number $x – x$ is denoted by 0. (It can be proved that 0 is **independent** of x). We write $– x$ for 0 and call $– x$ the negative of x.

Axiom 5. There exists at least one real number $x \neq 0$. If x and y are two real numbers with $x \neq 0$, then there exists a real number z such that $xz = y$. This z is denoted by y / x; the number.

x / x is denoted by 1 and can be shown to be independent of x. We write x^{-1} for $1 / x$ if $x \neq 0$, and call x^{-1} the **reciprocal** of x.

We also assume the **existence** of a **relation** > which **establishes** an ordering among the real numbers and which satisfies the following axioms:

Axiom A: Exactly one of the relations $x = y$, $x < y$, $x > y$ holds.

NOTE. $x > y$ means the same as $y < x$.

Axiom B: If $x < y$, then for every z we have $x = z < y = z$.

Axiom C: If $x > 0$ and $y > 0$, then $xy > 0$.

Axiom D: If $x > y$ and $y > z$, then $x > z$.

NOTE. A real number x is called **positive** if $x > 0$, and **negative** if $x < 0$. We denote by **R +** the set of all positive numbers and by **R -** the set of all negative numbers.

From these axioms we can **derive** the usual rules for operating with **inequalities**. For example, if we have $x < y$, then $xz < yz$ if z is positive, whereas $xz > yz$ if z is negative. Also if $x > y$ and $z > w$ where both y and w are positive, then $xz > yw$.

NOTE. The **symbolism** $x \leq y$ is used as an abbreviation for the **statement**:
"x < y" or "x = y".

Thus we have $2 \leq 3$ since $2 < 3$; and $2 \leq 2$ since $2 = 2$. The symbol $\geq$ is similarly used. A real number x is called **nonnegative,** if $x \geq 0$. A pair of **simultaneous** inequalities such as xy, yz is usually written more briefly as $x < y < z$.

NOTE!	**x > y** is read "**x** is greater than **y**"
	x < y is read "**x** is less than **y**"
	x = 0 is read "**x** is equal to zero"
	x ≤ y is read "**x** is equal or less than **y**"
	x < y < z is read " **y** is greater than **x** but less than **z**"
	xy is read "**x** times **y**" or "**x** multiplied by **y**"

EXERCISES

I. Pronounce the words correctly:

Existence, positive, negative, following, relation, rule, inequality, derive, both, abbreviation, call, satisfy, number, hold, nonnegative, briefly, distributive, associative, commutative, independent, some, appear, determine, set, nonnegative, inequality, statement, simultaneous, symbolism, abbreviation, pair, multiplication, addition, reciprocal, field axiom, order axiom, similarly, contrary.

II. Give the Russian equivalents of the following English words and word combinations:

1. a real number	7. reciprocal
2. the set of positive numbers	8. for operating with inequalities
3. a nonnegative number	9. commutative law
4. to derive the usual rules for	10. associative law

operating 5. an abbreviation for the statement 6. the existence of a relation	11.distributive law 12.simultaneous inequality

III. General understanding:

1. How can one define the term "relation"?
2. What do the commutative laws for operations of addition and multiplication say?
3. What way is the negative of a real number *x* denoted ?
4. What is a reciprocal of a real positive number x?
5. What do axioms A, B, C, and D given in the text say?
6. What real number is called positive?
7. What real number is called negative?
8. What rules can one derive from axioms A, B, C, and D for a set of real numbers?
9. What is a nonnegative real number?

IV. Agree or disagree with the following statements. If you agree start your answer with "I agree". If you don't agree start your answer with "I disagree (I don't agree)":

1.A real number x is called positive if $x > 0$, and it is called negative if $x < 0$.

2.A real number x is called nonnegative if $x - 0$.

3.The existence of a relation > satisfies the only axiom: If $x < y$, then for every z we have $x + z < y + z$.

4.The symbol $\geq$ is used similarly as the symbol $\leq$.

V. Translate the following sentences into English:

1. Действительное число x называется положительным, если выполняется отношение $x > 0$, и отрицательным, если выполняется отношение $x < 0$.

2. Давайте предположим, что существует отношение >, при котором устанавливается упорядоченность между действительными числами, и которое удовлетворяет ряду аксиом, например, аксиомам порядка.

3.Символ, применяемый в данном примере, используется точно таким же способом, как и предыдущий символ.

4. Множество всех положительных чисел обозначается при помощи символа R+, а множество всех отрицательных чисел - при помощи символа R-.

5.Это утверждение не удовлетворяет ни аксиоме порядка, ни аксиоме завершенности.

6.Существует, по крайней мере, одно число x, которое не равно нулю.

7. Действительное число x называется неотрицательным в том случае, если выполняется неравенство $x > 0$.

8. Согласно коммутативному закону сложения, от перестановки мест слагаемых их сумма не меняется.

VI. Translate the text into English:

Предположим, что для множества чисел **R** существуют две операции, называемые сложением и умножением, такие, что у любой пары действительных чисел x и y сумма и произведение также являются действительными числами, удовлетворяющими следующим аксиомам: аксиоме коммутативного закона, аксиоме ассоциативного закона и аксиоме дистрибутивного закона.

Дистрибутивный закон гласит, что произведение действительного) числа x и суммы действительных чисел y и z равно сумме двух произведений: произведения действительных чисел x и y, и произведения действительных чисел x и z.

VII. Discussing problem "The field and the order axioms".

ACTIVE VOCABULARY OF TEXT 3

average	средняя величина (среднее значение)
to be familiar (with)	познакомиться с
to contradict	противоречить
contradiction	противоречие
to denote	обозначать
elementary	элементарный
equation	уравнение
factor	множитель, фактор
factorization	разложение на множители
to imply	подразумевать
in common	общий
infinitely	бесконечно
irrationality	иррациональность
to lie between	располагаться между
multiple	кратное число
to note	помнить, иметь в виду
to obtain	получать
ordinarily	обычно, обыкновенно
perfect square	абсолютный, полный квадрат
proof	доказательство
to prove	доказывать
side	сторона (в уравнении)

square	квадрат, квадратный
to suppose	предполагать

TEXT 3
RATIONAL AND IRRATIONAL NUMBERS

Quotients of **integers a/b** (where **b≠0**) are called rational numbers. For example, 1/2, -7/5, and 6 are rational numbers. The set of rational numbers, which we **denote** by **Q,** contains **Z** as a subset. The students of mathematics should **note** that all the field axioms and the order axioms are satisfied by **Q**.

We assume that every student of mathematical department of universities is **familiar with** certain **elementary** properties of rational numbers. For example, if a and *b* are rational numbers, their **average** *(a + b)/2* is also rational and **lies between** *a* and *b*. Therefore between any two rational numbers there are **infinitely** many rational numbers, which **implies** that if we are given a certain rational number we cannot speak of the "next largest" rational number.

Real numbers that are not rational are called irrational. For example, **e, π,** $\mathbf{e^n}$ are irrational.

Ordinarily it is not too easy **to prove** that some particular number is irrational. There is no simple proof, for example, **of irrationality** of e^n. However, the irrationality of certain numbers such as √ 2 is not too difficult to establish and, in fact, we can easily prove the following theorem:

*If **n** is a positive integer which is not a* **perfect square,** *then √n is irrational.*

Proof. **Suppose** first that и contains no square **factor** > I. We assume that √n is rational and **obtain a contradiction.** Let √n = *a/b,* where *a* and *b* are integers having no factor **in common.** Then $nb^2 = a^2$ and, since the left **side** of this equation is a **multiple** of *n,* so too is a^2. However, if a^2 is a multiple of *n, a* itself must be a multiple of *n,* since *n* has no square factors > 1. (This is easily seen by examining **factorization** of *a* into its prime factors). This means that *a = cn,* where *c* is some integer. Then the **equation** $nb^2 = a^2$ becomes $nb^2 = c^2n^2$, *or* $b^2 = nc^2$. The same argument shows that *b* must be also a multiple of *n.* Thus *a* and *b* are both multiples of *n,* which **contradicts** the fact that they have no factors in common. This completes the **proof** if *n* has no **square** factor > 1.

If *n* has a square factor, we can write $n = m^2k$, where *k* > 1 and *k* has no square factor > 1. Then √n = *m√k;* and if √n were rational, the number √*k* would also be rational, contradicting that was just proved.

	a/b	is read "a over b"
	b≠0	is read "b is not equal to zero"
NOTE!	1/2	is read "one second"
	-7/5	is read "minus seven fifth
	(a+b)/2	is read "a plus b divided by two"
	e^{π}	is read "e to the power π”

EXERCISES

I. Pronounce the words correctly:

Quotient, integer, rational, example, should, familiar, certain, property, average, therefore, infinitely, imply, irrational, ordinarily, multiple, quotient, side, argument, common, proof, contradiction, factor, square, irrationality, theorem, establish, prove.

II. Give the Russian equivalents of the following English words and word combinations:

1. field axiom	7. factorization
2. order axiom	8. perfect square
3. average	9. irrationality
4. properties	10. rational number
5. equation	11. irrational number
6. multiple	12. quotient

III. Give the English equivalents of the following Russian words and word combinations:

Отношения целых, множитель, абсолютный квадрат, аксиома порядка, разложение на множители, уравнение, частное, рациональное число, элементарные свойства, определенное рациональное число, квадратный, противоречие, доказательство, среднее (значение).

IV. Put some special and alternative questions to the following sentences:

1. Quotients of integer are called rational numbers.
2. The set of rational numbers contains Z as a subset.
3. The students of mathematical faculties reader should remember that all the field axioms are satisfied by the set Q.
4. Between any two rational numbers there are infinitely many rational numbers.
5. The same argument shows that *b* must be also a multiple of *n*.
6. It is not too easy to prove that some particular number is irrational.

V. General understanding:

1. What is the average of any two real numbers?
2. Are there infinitely many rational numbers between any two rational numbers?
3. Why isn't it easy to prove that some particular number is irrational?
4. What number is a perfect square?
5. Why do we obtain a contradiction if we assume that $\sqrt{n}$ is rational?

6. Real numbers that are not rational are called irrational, aren't they? Give the examples of irrational numbers.

VI. Translate the following sentences into English:

1.Какие числа называются рациональными?

2.Какие аксиомы используются для множества рациональных чисел?

3.Сколько рациональных чисел может находиться между двумя любыми рациональными числами?

4.Действительные числа, не являющиеся рациональными, относятся к категории иррациональных чисел.

VII. Translate the text from Russian into English.

Обычно нелегко доказать, что определенное число является иррациональным. Не существует, например, простого доказательства иррациональности числа e^{π}. Однако, нетрудно установить иррациональность определенных чисел, таких как $\sqrt{2}$, и, фактически, можно легко доказать следующую теорему: если **n** является положительным целым числом, которое не относится к абсолютным квадратам, то $\sqrt{n}$ является иррациональным.

VIII. Match the terms from the left column and the definitions from the right column:

perfect square	any of two or more quantities which form a product when multiplied together
factor	the numerical result obtained by dividing the sum of two or more quantities by the number of quantities
multiple	the process of finding the factors
average	a number which is a product of some specified number and another number
factorization	a quantity which is the exact square of another quantity

IX. Translate into Russian:

An irrational number is a number that can't be written as an integer or as quotient of two integers. The irrational numbers are infinite, non-repeating decimals. There're two types of irrational numbers. Algebraic irrational numbers are irrational numbers that are roots of polynomial equations with rational coefficients. Transcendental numbers are irrational numbers that are not roots of polynomial equations with rational coefficients; π and e are transcendental numbers.

X. Discussing problem "Rational and irrational numbers".

ACTIVE VOCABULARY OF TEXT 4

above zero	выше нуля
absolute value	Абсолютная величина, абсолютное значение
algebra	алгебра
arithmetic	арифметика
directed numbers	направленные числа
direction	направление
distance	расстояние
signed numbers	числа со знаками
value	величина, значение

TEXT 4

SIGNED NUMBERS

I. Before starting to read the text look through the given words and word combinations. Pronounce them after the teacher.

to differ from	отличаться от
in many ways	во многом
the major difference	главное отличие
the use	использование
are known	известны
directed numbers	относительные числа
signed numbers	числа со знаками
is understood	понимается
it is convenient	удобно
absolute value	абсолютная величина
sign	знак

II. Comprehension questions (read and understand them before reading the text). Answer these questions after you have finished reading the text

1. From which branch of mathematics does algebra differ in many ways?
2. What is one of the major differences between algebra and arithmetic?
3. Why are positive numbers sometimes known as directed numbers?
4. Why are they known as signed numbers?
5. What is a positive number?
6. What is a negative number?
7. What is the absolute value of a number?
8. What sign is understood if no sign in front of a number is given?

III. Read and translate the text without using any dictionary

Algebra differs from **arithmetic** in many ways. One of the major differences between algebra and arithmetic is the use of negative numbers in algebra. Positive and negative numbers are sometimes known as **directed numbers** because they show **direction, or signed numbers,** because the plus (+) and minus (-) signs are used with them.

A positive number is a number that is greater than zero, and a negative number is less than zero. It is convenient in algebra to use the idea **of the absolute value** of a number. The absolute value of a number is a value of a number without its sign. So the absolute value of+6 is 6, and of-6 is also 6. If the sign in front of the number is not given, "plus" is understood. That is 6 means +6.

Examples

1. If distance east of certain point is taken as positive, distance west of that point is called negative.
2. If temperature **above zero** is taken as positive, temperature below zero is negative.

IV. Translate the text into English

Положительными называют числа больше нуля, а отрицательными – числа меньше нуля. В алгебре считается удобным применение понятия абсолютного значения числа. Под абсолютным значением понимается само данное число безо всякого знака перед ним. Поэтому абсолютное значение, например, таких чисел как +9 и -9 одинаково и равняется 9.

Применение в алгебре, в отличие от арифметики, отрицательных чисел объясняется тем, что в алгебре существует понятие целых чисел, которые могут быть как положительными, так и отрицательными.

V. Discussing problem "Signed numbers".

ACTIVE VOCABULARY OF TEXT 5

axiom	аксиома
axis	ось
choice	выбор
complex number	комплексное число
conversely	обратно
to correspond	соответствовать
to determine	определять
Euclidean geometry	Евклидова геометрия
interpretation	интерпретация
point	точка
projection	проекция
purpose	цель

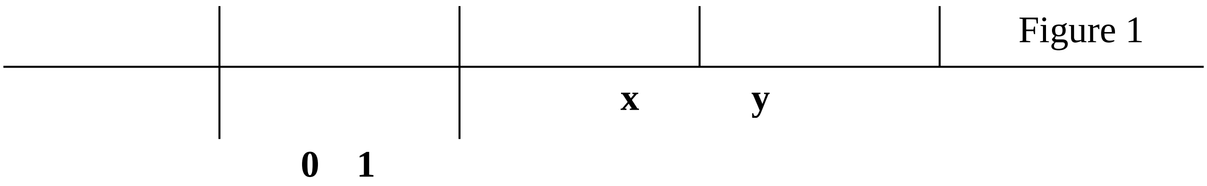
to represent	представлять
to select	выбирать
simple	простой
sphere	сфера
stereographic	стереографический
tangent plane	касательная плоскость

TEXT 5

GEOMETRIC REPRESENTATION OF REAL NUMBERS AND COMPLEX NUMBERS

The real numbers are often represented geometrically as **points on a line** (called **the real line or the real axis).** A point is selected to represent 0 and another to represent 1, as shown in figure 1. This choice determines **the scale.** Under an appropriate set of **axioms for Euclidean geometry,** each point on the real line corresponds to one and only one real number and, conversely, each real number is represented by one and only one point on the line. It is customary to refer to **the point x** rather than the point representing the real number *x*.

Figure 1



The order relation has a simple **geometric interpretation.** If $x<y$, the point x lies to the left of the point y, as shown in Figure 1. Positive numbers lie to the right of *0* and negative numbers lie to the left of 0. If **a < b,** a point x satisfies the inequalities $a < x < b$ if and only if x is between **a** and **b.**

Just as real numbers are represented geometrically by points on a line, so **complex numbers** are represented by points in a plane. The complex number $x = (x^1, x^2)$ can be thought of as the "point" with coordinates (x^1, x^2).

The idea of expressing complex numbers geometrically as points in a plane was formulated by Gauss in his dissertation in 1799 and, independently, by Argand in 1806. Gauss later coined the somewhat unfortunate phrase "complex number." Other geometric interpretations of complex numbers are possible. Riemann found the **sphere** particularly convenient for this **purpose**. Points of the sphere are **projected** from the North Pole onto the **tangent plane** at the South Pole and, thus there corresponds to each point of the plane a definite point of the sphere. With the exception of the North Pole itself, each point of the sphere corresponds to exactly one point of the plane. The correspondence is called **a stereographic projection**.

EXERCISES

I. Pronounce the words correctly:

often, represent, call, geometrically, axis, another, determine, appropriate, Euclidean, conversely, customary, rather, refer, interpretation, satisfy, inequality, complex number, plane, formulate, Gauss, Argand, unfortunate phrase, interpretation, surface, sphere, definite point, the North Pole, the South Pole, correspond, exception, stereographic, projection, dissertation.

II. Give the Russian equivalents of the following English words and word combinations:

1) interpretation
2) geometry
3) point
4) real line (real axis)
5) scale
6) set of axiom
7) Euclidean geometry
8) order relation
9) Inequality
10) Equality
11) plane
12) complex number
13) correspondence
14) sphere
15) tangent plane

III. Read and translate the words of the same roots:

to represent - representing - representation; geometry - geometric - geometrically; to correspond - corresponding - correspondence; to refer -reference; to interpret - interpretation; to relate - relating - relation; to differ - difference; to direct - direction.

IV. Give the English equivalents of the following Russian words and word combinations

Действительные числа, система аксиом, ось действительных чисел, масштаб (система счисления), геометрическая интерпретация, Евклидова геометрия, отношение упорядоченности, равенство, неравенство, плоскость, определенная точка, Северный Полюс, Южный Полюс, стереографический, поверхность, комплексное число, соответствие.

V. Translate the following word combinations into English

1. Точка, представляющая действительное число.
2. Действительное число, представленное точкой.
3. Эта точка представляет действительное число.
4. Мы представляем действительное число точкой на прямой.

VI. Agree or disagree with the following statements. If you agree start your answer with "I agree". If you don't agree start your answer with "I disagree (I don't agree)"

Any scale is determined by the choice of a point representing 0 and a point representing 1.

The real axis is the axis representing geometrically the real numbers.

Each point on the real line corresponds to a few real numbers.

The order relation can't have any geometric interpretation.

On the real line positive numbers always lie to the right of 0 and negative numbers - to the left of 0

VII. General understanding

1. What way are the real number often represented?
2. What does each point on the real line correspond to?
3. By what is each real number represented?
4. Where do positive and negative numbers He?
5. When does a point x satisfy the inequalities a < x < b?
6. Can complex numbers be represented on a plane or a line?
7. What numbers are called comlpex ones?
8. What is known in geometry as stereometric projection?
9. Who formulated the idea of expressing complex numbers geometrically as points on a plane?
10. Why was the sphere found by Riemann very convenient for representing complex numbers?

VI. Match the terms from the left column and the definitions from the right column

an axis	a prescribed collection of points, numbers or other objects satisfying the given condition
a scale	the act or result of interpretation; explanation, meaning
an axiom	a straight line through the center of a plane figure of a solid, especially one around which the parts are symmetrically arranged
complex	a system of numerical notation
a point	not simple, involved or complicated
an inequality	a statement pr proposition which needs no proof because its truth is obvious, or one that is accepted as true with out proof
a set	the relation between two unequal quantities, or the expression of this relationship
interpretation	an element in geometry having definite position, but no size, shape or extension

IX. Translate the paragraphs into Russian

A. Stereographic projection is a conformal projection of a sphere onto a plane. A point P *(the plane)* is taken on the sphere and the plane is perpendicular to the diameter through P. Points on the sphere, A, are mapped by straight line from P onto the plane to give points A'.

B. A tangent plane is a plane that touches a given surface at a particular point Specifically, it is a plane in which all the lines that pass through the point are tangents to the surface at the point. If the surface is a conical or cylindrical surface then the tangent plane will touch it along a line (the element of contact).

C. Argand's diagram or complex plane is any plane with a pair of mutually perpendicular axes which is used to represent complex numbers by identifying the complex number $a + ib$ with the point in the plane whose coordinates are (a, b). It's named after Jean Robert Argand (1768 - 1822), although the method's first exposition, in 1797, was by Casper Wessel (1745 - 1818), and the idea can be found in the work of John Wallis (1616-1703).

D. Complex numbers can be represented on an Argand diagram using two perpendicular axes. The real part is the x-coordinate and the imaginary part is the *y*-coordinate. Any complex number is then represented either by the point (a, b) or by a vector from the origin to this point. This gives an alternative method of expressing complex numbers in the form r (cos 9 + i sin 9), where r is the length of the vector and 9 is the angle between the vector and the positive direction of x-axis lines that pass through the point are tangents to the surface at the point. If the surface is a conical or cylindrical surface then the tangent plane will touch it along a line (the element of contact).

X. Discussing problem "Geometric representation of real numbers and complex numbers".

ACTIVE VOCABULARY OF TEXT 6

to cancel	сокращать
denominator	знаменатель
dividend	делимое
divisor	делитель
fraction	дробь
numerator	числитель
to reduce	сокращать, преобразовывать
to resolve	разлагать

TEXT 6

FRACTIONS

I. Read and translate the text without using any dictionary

The word **fraction** is derived from the Latin word *fractio,* which means *to break.*

A fraction is the indicated quotient of two expressions. The quotient is usually indicated by the form **a/b**, which means *a* divided by *b*. The **numerator** of a fraction is the **dividend** and the **denominator** is the **divisor.** Fractions in algebra have in general the same properties as fractions in arithmetic.

For example: in arithmetic **8/12 = 2/3**; in algebra **5ax/5ay = x/y**. A fraction in its lowest term is a fraction whose numerator and denominator have no common factor.

To **reduce** a fraction to its lowest term, the rule is the same as in arithmetic: we **resolve** the numerator and denominator by the factors common to both.

In this sense the word **cancel** is understood to mean the process of dividing the numerator and denominator by the factor common to both.

Fractions are classified as: a) common or simple or vulgar fractions in which numerator and denominator are both integers; b) complex fractions in which the numerator and denominator are themselves fractions; c) proper fractions in which the numerator is less than the denominator; d) improper fractions in which the numerator is greater than the denominator; e) mixed fractions which are the mixture of an integer and a proper fraction.

A continued fraction is a fraction in which the denominator is. a number plus another fraction, which in turn may have a denominator consisting of a number plus another number.

There are also reducible and irreducible fractions. Any reducible fraction is a common fraction such as 4/6 in which the numerator and denominator have a common factor greater than the unity. Any irreducible fraction is a common fraction such as 2/7in which the numerator and denominator are relatively primes.

II. General understanding

1. What Latin word is the word "fraction" derived from?
2. What is a fraction?
3. In what way is the quotient usually indicated?
4. What is a numerator of a fraction?
5. What is a denominator of a fraction?
6. What properties does fraction have in algebra?
7. What must one do to reduce a fraction to its lowest term?
8. Dividend is a number by which we divide another number, isn`t it?
9. What is a fraction in its lowest terms?
10. What do we do to reduce a fraction to its lowest terms?
11. What types of fractions do you know?
12. What is a difference between a proper fraction and an improper fraction?
13. What is the main peculiar feature of a continued fraction?
14. Explain the main difference between a reducible and an irreducible fraction.

III. Agree or disagree with the following statements. If you agree start your answer with "I agree". If you don't agree start your answer with "I disagree (I don't agree)"

1. A fraction is the indicated quotient of two expressions.
2. A fraction in its lowest terms is a fraction whose numerator and denominator have some common factors.

3. Fractions in algebra have in general the same properties as fractions in arithmetic.

4. The numerator of a fraction is the divisor and the denominator is the dividend.

5. In order to reduce a fraction to its lowest terms we must resolve the numerator and denominator by the factors common to both.

IV. Match the terms from the left column and the definitions from the right column

fraction	the number or quantity by which the dividend is divided to produce the quotient
expression	any quantity expressed in terms of a numerator and denominator
divisor	a showing by a symbol, sign, figures
dividend	the term above or to the left of the line in a fraction
common factor	the term below or to the right of the line in a fraction
numerator	to change in denomination or form without changing in value
denominator	factor common to two or more numbers
to reduce	the number or quantity to be divided

IV. Render the text into Russian

A fraction is a quotient of two numbers usually indicated by *a/b.* The dividend *a* is called the numerator and the divisor *b* is called a denominator. Fractions are classified into 5 categories: common (simple, vulgar) fractions, complex fractions, proper fractions, improper fractions and mixed fractions.

In common fractions both numerator and denominator are integers. In complex fractions the numerator and denominator are themselves fractions. In proper fractions the numerator is less than the denominator. In improper fractions the denominator is greater than the denominator. And, at last, a mixed fraction is an integer together with a proper fraction.

V. Discussing problem "Fractions".

ACTIVE VOCABULARY OF TEXT 7

Arabs	арабы
Babylonians	вавилоняне
Chinese	китайцы
Hindus	индусы
Moslems	мусульмане
Sumerians	шумеры
Archimedes	Архимед

Copernicus	Коперник
Galileo	Галилео Галилей
Lobachevsky	Лобачевский
Isaac Newton	Исаак Ньютон
Rene Descartes	Рене Декарт

TEXT 7

SOME FACTS OF THE DEVELOPMENT OF THE NUMBER SYSTEM

I. Read and translate the following text

Our present number system has not always been so fully developed as it is today. The number system is closely connected with early prehistoric man and with the most recent discoveries in atomic science.

But there was a time when man did not know how to count. The origin of number and counting is hidden behind countless **prehistoric ages (1).** No one knows when counting first began. Before man learned to count, he probably used names of signs for each person or thing. It is believed that the early shepherds would call their sheep by name in order to determine **if any of them were missing (2).** Counting represents a very important milestone in the progress of civilization. Of course, there were no number names at first; so counters were used. For counters man used sticks, **pebbles (3),** his fingers, and in some instances, his toes too. In fact, the word **calculus (4)** comes from the Latin, meaning *"pebble";* our numerals are called digits from the Latin word, meaning *"finger"*.

The early shepherd probably learned that, instead of calling his sheep by name, he could lay aside a pebble for each sheep as he led them to the corral for the night and thus learned if any of them had been lost.

It is possible to mention only a few important achievements in the history of mathematics. Historical records give evidence of the astronomical and arithmetical achievements of the early Babylonians, Sumerians and Chinese. Somewhere in the distant past man learned that number was useful for civilized living. As early as 5700 **B. C. (5)** predecessors of the Babylonians had calendar and a type a of practical arithmetic.

One of the greatest mathematicians of recorder history-was the Greek Archimedes (287 - 212 B. C.) who developed a dynamic mathematics which could be applied to the laws of nature.

Going to the Renaissance period, we find the tribes of Moslems coming to Europe, bringing with them the culture of many civilizations, including a strange number system acquired from Hindus.

Only about 300 years ago a great mathematician and philosopher, Rene Descartes (1596 - 1650), represented a number pair by points. This creation made possible the great advance in science and mathematics during the 18* century. In 1648 one of the greatest minds of all times Isaac Newton was born (1642 - 1727). Newton was one of the inventors of the calculus which is now studied by college students who are seriously interested in mathematics or physical science.

Few discoveries in world science can equal the discoveries of Lobachevsky (1792 - 1856). Like Archimedes, Galileo, Copernicus and Newton, he is one of those who laid the foundations of science. Lobachevsky created one of the greatest masterpieces of mathematics - non-Euclidean geometry.

Our number system uses only the symbols 0, 1, 2, …… , 9; it has base ten and **positional notation (6).** Thus any integer can be expressed with these symbols in various combinations and arrangements. The base of our system is ten. Ten is probably the base because we have ten fingers and the fingers were used in the early stages of counting.

It is not known when or by whom zero (naught) was invented. Historians think that zero was introduced by the Hindus or the **Babylonians (7)** not later than in the 9^{th} century A.D. (8) and probably as early as the 2^{nd} century B.C. The invention of zero and our number system is one of the greatest achievements of the human race, without which the progress of science, industry, and commerce could be impossible. The new system was introduced in Europe by the Arabs, or Moslems, at about the beginning of the 10^{th} century. These new numbers were used, and finally, after about five centuries, the decimal system won the battle.

Notes:

1. – доисторические времена
2. – не отсутствуют ли какие-нибудь из них
3. – булыжники
4. – исчисление
5. – до Рождества Христова
6. – позиционное обозначение
7. – жители Вавилона
8. – наша эра

II. Divide the text into logical parts. Entitle each of them.

III. Prove the following statements

1. Counting hasn't always existed in the life of people.
2. Counting is a milestone in the progress of civilization.
3. Ancient people used not only numbers but various things for counting.
4. The calendar was invented by the predecessors of the Babylonians.
5. Greeks have made a great contribution into the development of counting and mathematics on the whole.
6. Nickolay Lobachevsky's discoveries in mathematics are among the most outstanding ones.
7. Positional notation is of great importance in modern number system.

IV. Fill in the blanks with suitable words

1. Our present ... system has not always been so fully developed as it is today.
2. Counting represents a very important ... in the progress of civilization.
3. Numerals are called ... from the Latin word, meaning "finger".

4. As early as 5700 B.C. ... of the Babylonians had calendar and a type a of practical arithmetic.
5. It was Archimedes who developed a ... mathematics.
6. It was Rene Descartes, who represented a ... by points.
7. Newton was one of the ... of the calculus.
8. One of the ... of mathematics - Non-Euclidean geometry was created by Lobachevsky.

V. Ask 8 – 10 special, disjunctive and alternative questions on the text "Some facts on the development of the number system".

VI. Discussing problem "Some facts on the development of the number system".

UNIT 2

FUNDAMENTAL ARITHMETICAL OPERATIONS

Цель занятия: развитие лексических навыков; повторение грамматического материала; развитие и совершенствование навыков работы по тексту со словарем.

Задачи занятия: Ознакомление с новой лексикой по теме; развитие и совершенствование навыков чтения текста с целью детального понимания содержания.

BASIC TERMINOLOGY		
I. ADDITION – сложение		
3 + 2 = 5 → в этом примере:		
3 & 2	**- ADDENDS**	- слагаемые
+	**- PLUS SIGN**	-знак плюс
=	**- EQUALS SIGN**	- знак равенства
5	**- THE SUM**	- сумма
II. SUBTRACTION – вычитание		
3 – 2 = 1 → в этом примере:		
3	**- THE MINUEND**	- уменьшаемое
–	**- MINUS SIGN**	- знак минус
2	**- THE SUBTRAHEND**	- вычитаемое
1	**- THE DIFFERENCE**	- разность
III. MULTIPLICATION – умножение		
3 x 2 = 6 → в этом примере:		
3	**- THE MULTIPLICAND**	- множимое
x	**- MULTIPLICATION SIGN**	- знак умножения
2	**- THE MULTIPLIER**	- множитель
6	**- THE PRODUCT**	- произведение
3 & 2	**- FACTORS**	- сомножители
IV. DIVISION – деление		
6:2 = 3 → в этом примере:		
6	**-THE DIVIDEND**	- делимое
:	**- DIVISION SIGN**	- знак деления
2	**- THE DIVISOR**	- делитель
3	**- THE QUOTIENT**	- частное

VOCABULARY OF TEXT 1

to add	складывать
addend	слагаемое
to check	проверять
to consider	рассматривать
to define	определять
difference	разность
to express	выражать
to interpret	интерпретировать
minuend	уменьшаемое
to proceed	продолжать
to produce	производить
size	размер, величина, значение
to signify	означать, значить
single	единственный, единый
to subtract	вычитать
subtraction	вычитание
subtrahend	вычитаемое

TEXT 1

ADDITION AND SUBTRACTION

ADDITION

Positive and negative numbers are sometimes known as directed numbers because they signify direction. In arithmetic only undirected numbers with no sign in front of them are used. In algebra, the sign is considered as well as the size of the number. For example, in arithmetic, 7 + 5 = 12. The plus sign is the sign of operation.

In algebra the same process becomes (+7) + (+5) = +12. The first and the third plus signs show direction; the second plus sign is the sign of operation.

In algebra we add signed numbers, such as + 9 and - 7. The relation is expressed thus: (+9) + (- 7) = +2.

From our study of positive and negative numbers we interpret it as 9 steps up and 7 steps down, which results in 2 steps up. Algebraic addition is a combination of several algebraic expressions into a single **equivalent expression**.

SUBTRACTION

Subtraction is defined as the inverse of addition. That is, **to subtract** a number **a** from a number **b** means to find a number, which, when added to **a**

gives **b**. To subtract signed numbers, we change the sign of the **subtrahend** and proceed as in addition.

Examples:

+5	**+5**	**-5**	**-5**
-	**-**	**-**	**-**
+3	**-3**	**+3**	**-3**
+2	**+8**	**-8**	**-2**

To subtract one algebraic expression from another, we change the signs of the subtrahend, and proceed as in addition.

To check a subtraction, we add **the difference** to the subtrahend; the result produces another **quantity - the minuend**.

Thus, if we subtract **3ab** from **10ab**, we obtain **7ab**, for **7ab** added to **3ab** produces **10ab**.

	7 + 5 = 12	is read	seven plus five equals twelve
		or	seven plus five is equal to twelve
		or	seven and five is (are) twelve
NOTE!		or	seven added to five makes twelve
	7 – 5 = 2	is read	seven minus five equals two
		or	five from seven leaves two
		or	difference between five and seven is two
		or	seven minus five is equal to two

EXERCISES

I. Pronounce the words correctly:

to direct, to signify, direction, arithmetic, undirected, in front of, to consider, as well as, operation, to be expressed, equivalent, addition, subtraction, to know, to change, subtrahend, quantity, to proceed, difference, to produce, thus, to obtain, minuend.

II. Give the Russian equivalents of the following English words and word combinations

1. to add	6. equivalent	11. quantity
2. addition	7. expression	12. to subtract
3. addend	8. minuend	13. subtraction
4. arithmetic	9. numerals	14. subtrahend
5. difference	10. operation	15. sum

III. Give the English equivalents of the following Russian words and word

combinations:

Вычитаемое, величина, уменьшаемое, алгебраическое сложение, эквивалентное выражение, вычитать, разность, сложение, складывать, слагаемое, сумма, числительное, числа со знаками, относительные числа.

IV. Practice reading numerals. Follow the pattern

	23 is read	"twenty three"
	578 is read	"five hundred (and) seventy eight"
NOTE!	**3578** is read	"three thousand five hundred (and) seventy eight"
	7425629 is read	"seven million four hundred twenty five thousand six hundred and twenty nine"

76, 13, 89, 53, 26, 12, 11, 71, 324, 117, 292, 113, 119, 926, 929, 735, 473, 1002, 1026, 2606, 7354, 7013, 3005, 10117, 13526, 17427, 72568, 634113, 815005, 905027, 65347005, 900000001, 10725514, 13421926, 65409834, 815432789, 76509856, 1000000, 6537.

V. Read and write down in words the following numerical expression:

425 – 25 = 400	1617 + 17 = 1634	34582 + 25814 = 60396
730 – 15 = 715	1215 + 60 = 1275	768903 - 420765 = 348138
222 – 22 = 200	1511 + 30 = 1541	1634986 - 1359251 =275735

VI. Given certain definitions. Your task is to determine what is defined. Follow the pattern

Pattern: The operation, which is the inverse of addition.
It is subtraction

1. the operation, which is the inverse of subtraction;
2. the quantity, which is subtracted;
3. the result of adding two or more numbers;
4. the result of subtracting two or more numbers;
5. to find the sum;
6. to find the difference;
7. the quantity or number from which another number (quantity) is subtracted;
8. the terms of the sum.

VII. General understanding:

1. What do directed numbers signify?
2. What numbers are used in arithmetic?
3. What besides the size of the number is considered in algebra?
4. How do we interpret addition of signed numbers from our study of positive and negative numbers?
5. What is algebraic addition?
6. What arithmetic operation is called Subtraction?
7. Subtraction is defined as the inverse of multiplication, isn't it?
8. What do we do to subtract one algebraic expression from an other?
9. What do we do to check subtraction?
10. We add only signed numbers in algebra, don't we?

VIII. Fill in the blanks with suitable words:

1. Subtraction is ... of addition.

2. Addition and subtraction are arithmetical….
3. Positive and negative numbers are known as ... numbers.
4. Minuend is a number from which we ... subtrahend.
5. The process of checking subtraction consists of adding subtrahend to….
6. In arithmetic only ... numbers with no ... in front of them are used.

IX. Match the terms from the left column and the definitions from the right column:

algebra	a number or quantity to be subtracted from another one
to add	to take away or deduct (one number or quantity from another)
addition	the result obtained by adding numbers or quantities
addend	the amount by which one quantity differs from another
to subtract	to join or unite (to) so as to increase the quantity, number, size, etc. of change the total effect
subtraction	a number or quantity from which another is to be subtracted
subtrahend	equal in quantity, value, force, meaning
minuend	an adding of two or more numbers to get a number called the sum
difference	a number or quantity to be added to another
sum	the mathematical process of finding the difference between the two numbers or quantities
equivalent	a mathematical system using symbols, esp. letters, to generalize certain arithmetical operations and relationships

X. Translate the sentences into English

1. К числу основных математических операций, с которыми мы сталкиваемся в повседневной жизни, относятся сложение и вычитание.
2. При сложении необходимо сложить два или более слагаемых
3. Вычитание числа x из числа y означает арифметическое действие нахождения числа z, которое при сложении с числом y давало бы число x.
4. При проверке вычитания необходимо к разности прибавить вычитаемое. В результате получим уменьшаемое.
5. Положительные и отрицательные числа определяют направление.
6. Сложение в алгебре заключается в соединении ряда алгебраических выражений в единое выражение.

XL Translate the text into English

Сложением в математике называется действие (operation), выполняемое над двумя числами, именуемыми (named) слагаемыми, для получения искомого числа, суммы. Данное действие можно определить как увеличение величины одного числа на другое число.

При сложении двух дробей необходимо привести обе дроби к общему знаменателю, а затем сложить числители. Сложение чисел одновременно и коммутативно, и ассоциативно. При сложении комплексных чисел надо складывать действительную (real) и мнимую (imaginary) части раздельно (separately).

Действие, обратное (inverse to) сложению, в математике называется вычитанием. Это процесс, в котором даны два числа и требуется найти третье, искомое число. При этом, при прибавлении искомого третьего числа к одному из данных должно получиться второе из данных чисел.

XII. Discussing problem «Addition and subtraction»

VOCABULARY OF TEXT 2

to divide	разделить
division	деление
expression	выражение
factor	множитель
important	важный
inverse	обратная
meaningless	бессмысленный
multiplicand	множимое
multiplier	множитель
to multiply	умножать
operation	операция, действие
product	произведение
quotient	частное
remainder	остаток

TEXT 2
«Fundamental arithmetical operations»

MULTIPLICATION AND DIVISION

We may say that subtraction is **the inverse operation** of addition since 5+2=7 and 7-2= 5.

The same might be said about **division** and multiplication, which are also inverse operations.

In multiplication there is a number that is multiplied, It is **the multiplicand.** There is also a multiplier. It is the number by which we **multiply.** When we are multiplying the multiplicand by the multiplier we get **the product** as a result. When two or more numbers are multiplied, each of them is called **a factor. In the**

expression five multiplied by two (5 x 2), the 5 and the 2 will be factors. The multiplicand and the multiplier are names for factors.

In the operation of division there is a number that is divided, it is called **the dividend;** the number by which we divide is called **the divisor.** When we are dividing the dividend by the divisor we get **the quotient.** But suppose you are dividing 10 by 3. In this case the divisor will not be contained a whole number of times in the dividend. You will get a part of the dividend left over. This part is called **the remainder.** In our case the remainder will be 1. Since multiplication and division are inverse operations you may check division by using multiplication.

There are two very important facts that must be remembered about division.

1)The quotient is 0 (zero) whenever the dividend is zero and the divisor is not zero. That is, 0:n is equal to 0 for all values of n except n = 0.
Division by 0 is meaningless. If you say that you cannot divide by 0 it really means that division by 0 is meaningless for all values of **n.**

	5 x 2 = 10	is read	"five multiplied by two is equal to ten"
NOTE!		or	"five multiplied by two equals ten"
		or	"five times two is ten"

EXERSICES

I. Pronounce the words correctly:

Multiplication, might, said, division, inverse, multiplied, multiplicand, multiplier, dividend, product, factor, dividend, divisor, divided, over, quotient, remainder, using, values, except, meaningless.

II. Give the Russian equivalents of the following English words and word combinations:

1) multiplication	6. multiplier	11. product
2) inverse	7. multiplicand	12. factor
3) to multiply	8. to check	13. quotient
4) to divide	9. dividend	14. remainder
5) division	10. divisor	15. expression

III. Give the English equivalents of the following Russian words and word combinations:

деление, умножение, делить, остаток, частное, произведение, выражение, обратная операция, делитель, делимое, множитель, множимое, сомножители, сумма, знак умножения, знак деления.

IV. General understanding

1. Are division and multiplication inverse operations? Why do you think so?
2. The number which is multiplied is multiplicand, isn't it?

3. Do we get quotient as the result of division or multiplication?
4. What is the multiplier?
5. What is the multiplicand?
6. Is the divisor the number by which we divide or which is divided"
7. Why is division by zero meaningless?
8. The quotient is always zero when the dividend is zero, isn't it?
9. What way can we check the operations and division?
10. Is the remainder always left after the operation of division?
11. What two very important things must one remember about the division?

V. Read and translate the following sentences. Put some special questions to them. Make the sentences negative

1. Everybody can say that division is an operation inverse of addition.
2. One can say that division and multiplication are inverse operations.
3. The number which must be multiplied is multiplicand.
4. We multiply the multiplicand by the multiplier.
5. We get the product as the result of multiplication.
6. If the divisor is contained a whole number of times in the dividend, we won`t get any remainder.
7. The remainder is a part of the dividend left over after the operation is over.
8. The addends are numbers added in addition.

VI. Read and write down in words the following numerical expressions:

1) 100 x 2 = 200
2) 135 x 4 = 540
3) 450 x 3 = 1350
4) 107 x 5 = 535
5) 613 x 13 = 7969

6. 512 : 8 = 64
7. 1624 : 4 = 406
8. 456 : 2 = 228
9. 1000 : 100 = 10
10. 810 : 5 = 162

VI.Given certain definitions. Your task is to determine what is defined. Follow the pattern

Pattern: A number that is divided. It is a dividend.

1) the process of cumulative addition;
2) the inverse operation of multiplication;
3) a number that must be multiplied;
4) a number by which we multiply;
5) a number by which we divide;
6) a part of the dividend left over after division;
7) the number which is the result of the operation of multiplication.

VIII. Translate the text into English

Преподаватель попросил своих студентов сложить числа 5, 8 и 6. Некоторые из студентов сначала (first) сложили 5 и 8 и получили 13. Затем они сложили 13 и 6 и получили 19. Другие студенты сначала сложили 8 и 6 и получили 14, а затем сложили 14 и 5, получив 19 тот же результат.

Приведенные примеры иллюстрируют (illustrate) две важные характеристики сложения. Одна из них заключается в том, что сложение является операцией, применяемой (applied to) только к двум числам одновременно (at a time). Другой характеристикой является то, что сумма двух или более чисел неизменна, независимо от (regardless of) порядка сложения.

IX. Translate the definitions of the following mathematical terms:

1) to divide – to separate into equal parts by a divisor;
2) division – the process of finding how many times (*a number*) is contained in another number (the *divisor*);
3) divisor – the number or quantity to be dividend is divided to produce the quotient;
4) dividend – the number or quantity to be divided;
5) to multiply – to find the product by multiplication;
6) multiplication – the process of finding the number or quantity (*product*) obtained by repeated additions of a specified number or quantity;
7) multiplier – the number by which another number (the *multiplicand*) is multiplied;
8) multiplicand – the number that is multiplied by another (the *multiplier*);
9) remainder – what is left undivided when one number is divided by another that is not one of its factors;
10) product – the quantity obtained by multiplying two or more quantities together;
11) to check – to test, measure, verify or control by investigation, comparison or examination.

X. Fill in the blanks with suitable words

1. The multiplicand is a number, which must be … by a multiplier.
2. The number by which we divide is …
3. Division and multiplication as well as addition and … are inverse …
4. Division by … is meaningless.
5. The ... is the part of the dividend left over after the division if the ... isn't contained a whole ... of times in the dividend.
6. The multiplicand and ... the names for factors.
7. The product is get as the result of multiplying multiplicand and ....

XI. Match the terms from the left column and the definitions from the right column

to divide	to test, measure, verify or control by investigation, comparison or examination

division	the process of finding the number or quantity *(product)* obtained by repeated additions of a specified number or quantity
dividend	the number by which another number is multiplied
divisor	what is left undivided when one number is divided by another that is not one of its factors
ip multiply	to separate into equal parts by a divisor
multiplication	the process of finding how many times a -number is contained in another number
multiplicand	the number or quantity to be divided
multiplier	the quantity obtained by multiplying two or more quantities together
remainder	the number that is multiplied by another
product	the number or quantity by which the dividend is divided to produce the quotient
to check	to find the product by multiplication

XII. Discussing problem «Multiplication and division».

TEXT 3

(for individual work)

NATURAL NUMBERS

I. Read and translate the text without using any dictionary

The natural numbers are 1, 2, 3, 4, 5….. They arise in the process of counting. Counting a set of objects consists of establishing a one-to-one correspondence between the objects and the names of natural numbers. Thus we point to an object and say «one», point to another and say «two» and so on.

The operations of addition, subtraction, multiplication and division are associated with the set of natural numbers. Addition is the process of finding the sum of two or more numbers. It is based on the idea of counting. Subtraction is the inverse of addition. Multiplication is the process of cumulative addition. Division is the inverse of multiplication.

There are certain fundamental **principles** associated with the set of natural numbers and the operations of addition, subtraction, multiplication and division. They are so fundamental that they are accepted without proof. They are called postulates or assumptions. Among these postulates we know the following:

a) the **associative** law;
b) the **commutative** law;
c) the **distributive** law.

II. General understanding

1. What natural numbers do you know?
2. In what process do natural numbers arise?
3. What does the counting a set of objects consist of?
4. What are the operations of addition, subtraction, multiplication and division associated with?
5. Is multiplication or division the process of cumulative addition?
6. What principles associated with operations of addition, subtraction, multiplication and division are accepted without proof?

III. Translate the definitions of the following mathematical terms:

1). postulate - something taken as self-evident or axiomatic;

2). principle - a fundamental truth, law, doctrine, or motivating force; upon which others are based;

3). cumulative - increasing in effect, size, quantity, etc. by successive additions;

4). associative - of or pertaining to an operation in which the result the same regardless of the way the elements are grouped;

5). distributive - of the principle in multiplication that allows the multiplier to be used separately with each term of the multiplicand;

6). commutative - of or pertaining to an operation in which the order of the elements doesn't affect the result.

(From Webster's New World Dictionary).

IV. Agree or disagree with the following statements. If you agree start your answer with "I agree". If you don't agree start your answer with "I disagree (I don't agree)":

1. Counting a set of objects consists of establishing a one-to-one correspondence between the objects and the names of natural numbers.
2. Multiplication is the process of finding the sum of two or numbers.
3. Subtraction is the inverse of addition.
4. Multiplication is the process of cumulative division.
5. There are certain fundamental principles associated with the set of natural numbers which are accepted without proof.

V. Match the terms from the left column and the definitions front the right column

cumulative	of or pertaining to an operation in which the order of the elements doesn't affect the result
distributive	of or pertaining to an operation in which the result is the same regardless of the way the elements are grouped
commutative	of the principle in multiplication that allows the multiplier to be used separately with each term of the multiplicand
associative	increasing in effect, size, quantity, etc. by successive additions

postulate	a fundamental truth, law, doctrine, or motivating force, upon which others are based
principle	somethihg taken as self-evident or axiomatic something taken as self-evident or axiomatic

VI. Discussing problem "Natural numbers".

TEXT 4
(Discussing problem)

I. Read and translate the following text

WHAT ARE IMAGINARY NUMBERS?

There are two kinds of numbers that most of us are familiar with: positive numbers (+5; +17.5) and negative numbers (-5; -17.5) introduced in **the Middle Ages (1)** to solve problems like 3 minus 5. To the ancients, it seemed impossible to subtract five apples from three apples. The medieval bankers, however, had a clear notion of debt. «Give me five apples. 1 only have money for three apples, but 1 will owe you for two». This is like saying $(+3) - (+5) = (-2)$

Positive and negative numbers can be multiplied according to certain strict rules. A positive number multiplied by a positive number gives a positive product. A positive number multiplied by a negative number gives a negative product. And most important, a negative number multiplied by a negative number gives a positive product.

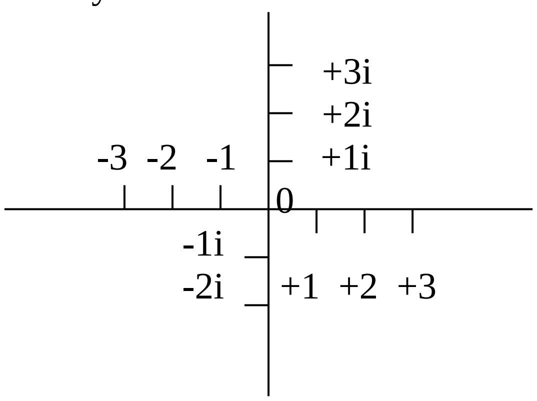
Thus: $(+1) \times (+1) = (+1)$; $(+1) \times (-1) = (-1)$; $(-1) \times (-1) = (+1)$

Now suppose we ask ourselves: What number multiplied by itself gives us +1? Or, to say it more mathematically: What is the square root of +1?

There are two answers. One is +1, since $(+1) \times (+1) = (+1)$. The other answer is -1 since $(-1) \times (-1) = (+1)$. Mathematicians write this down as $\sqrt{+1} = \pm 1$.

Let's go on and ask: What is $\sqrt{-1}$? **Here we are stuck (2).** It isn't +1 because that multiplied by itself is +1, too. To be sure, $(+1) \times (-1) = (-1)$, that is multiplication of two different numbers and not a number multiplied by itself.

So we can invent a number and give it a special sign, say, # 1, defining it as follows: #1 is, a number such that $(\sqrt{l}) \times (\sqrt{l}) = (-1)$. When this notion was first introduced, mathematicians spoke of it as an «imaginary number» simply because it didn't exist in the system of numbers **to which they were accustomed (3)**. Actually it is no more imaginary man the ordinary «real numbers». The so-called imaginary numbers have carefully defined properties and can be manipulated as easily as the other numbers.



-3i _

And yet because the new numbers were **felt to be imaginary (4)** the symbol **i** was used. We can speak of positive imaginary numbers **(+i)** and negative imaginary numbers **(-i),** whereas (+1) is a positive real number and (-1) is a negative real number. Thus we can say $\sqrt{-1} = -i$. The system of real numbers can be **exactly matched (5)** in the system of imaginary numbers. If we have +5, +17.32, +3/10, we can have +5i, +17.32i, +3i/10.

You can even picture the imaginary system of numbers. Suppose you represent the real number system on a straight line with 0 in the center. The positive numbers are on the one side of zero and the negative numbers on the other.

You can then represent the imaginary system of numbers along another line, **crossing the first at right angles (6)** at the zero point, with the positive imaginaries on the one side of the zero and the negative imaginaries on the other. Numbers can be located anywhere in the plain by using both kinds together: (+2) + (+3i) or (+3) + (-2i). These are «complex numbers».

Mathematicians and physisists find it very useful to be **able to associate all points in a plane with a number system (7)**. They couldn't do without the so-called «imaginary» numbers.

Notes:

1). the Middle Ages - средние века;

2). here we are stuck - вот здесь и возникает трудность;

3). to which they were accustomed - которую они считали привычной;

4). were felt to be imaginary - считались воображаемыми;

5). can be exactly matched in - может быть точно соотнесена с ...;

6). crossing... at the right angles - пересекая ... под прямым углом;

7). to associate all points in a plane with a number system – соотносить все точки на плоскости с числовой системой.

II. Divide the text into logical parts. Entitle each of them.

III. Agree or disagree with the following statements. If you agree start your answer with "I agree". If you don't agree start your answer with "I disagree (I don't agree)"

1). Positive and negative numbers were introduced in the Middle Ages because people needed them in their everyday life.

2). A positive number multiplied by another positive number always gives only negative product.

3). An imaginary number is a number that doesn't exist in reality and that is invented by mathematicians on certian purpose.

4). The system of real numbers can be exactly matched in the system of imaginary numbers.

5). When we try to represent the real number system on a straight line with 0 in the center, we have the positive numbers on the one side of zero and the negative numbers on the other.

6). Mathematicians and physisists find it very useful to associate only certain points but not all points in a plane with a number system.

IV. Fill in the blanks with suitable words from the text

1). The medieval bankers had a clear ... of debt.

2). Positive and negative numbers can be ... according to certain strict rules.

3). The imaginary numbers don't exist in the ... of numbers to which they are ...

4). The system of real numbers can be exactly ... in the system of. imaginary numbers.

5). One can ... the imaginary system of numbers.

V. Put 8-10 special and alternative questions on the text.

VI. Discussing problem "What are imaginary numbers?"

TEXT 5
(for individual work)

NUMBERS AND FUNDAMENTAL ARITHMETICAL OPERATIONS

1. Choose the correct term corresponding to the following definitions:

а) A quotient of one number by another.

square root	mixed number
integer	fraction
division	divisor

б) The inverse operation of multiplication

addition	fraction
subtraction	quotient
division	integer

в) A whole number that is not divisible by 2.

integer	prime number
odd number	complex number
even number	negative number

г) A number that divides another number.

dividend	division
divisor	division sign

quotient remainder

д) The number that is multiplied by another

multiplication remainder
multiplicand multiplier
product dividend

2. Give the English equivalents of the following Russian words and word combinations:

Остаток, геометрическая интерпретация, именованное число, несократимая дробь, мнимое число, (со) множитель, аксиома полноты.

3. Give the Russian equivalents of the following English words and word combinations:

1. imaginary part;	6. division sign;
2. mixed fraction;	7. multiplicand;
3. positive integer;	8. divisor;
4. real axis;	9. addend;
5. abstract number;	10.quotient.

4. Translate the text without using any dictionary:

PRIMES

A prime is a whole number larger than 1 that is divisible only by 1 and itself. So 2, 3, 5, 7, ..., 101, ..., 1093 ... are all primes. Each prime number has the following interesting property: if it divides a product, then it must divide at least one of the factors.

No other number bigger than 1 have this property. Thus 6, which is not a prime, divides the product of 3 and 4 (namely 12), but does not divide either 3 or 4. Every natural number bigger than 1 is either a prime or can be written as a product of primes. For instance 18 = 2 x 3 x 3, 37 is a prime, 91 = 7 x 13.

The term can also be used analogously in some other situations where division is meaningful. For instance, in the context of all integers, an integer n other than 0, +1, is a prime integer, if its only integer divisors are +1 and +n. The positive prime integers are just the ordinary natural prime numbers 2, 3, 5, and the negative prime integers are -2, -3, -5.

Notes:

1. either... or - или ... или
2. analogously - аналогично
3. meaningful - имеющий смысл
4. only (зд.) - единственный

5. ordinary - обычный

5. General understanding

1. What number is a prime?
2. What an interesting property of primes can you name?
3. Why can one write any number bigger than 1 either as a prime or as a product of primes?
4. Can one use the term "prime" analogously in some other situations? If one can, name at least one situation.

Additional Texts for Reading and Retelling

Mathematics

Counting and numbers

No one knows when man first began to use language or when he first began to count. But primitive men probably matched the things they wanted to count against something else, such as notches in a stick, or pebbles or knots tied on a cord. As each day passed, for instance, a pebble could be added to a pile. We say now that there is a one-to-one correspondence between the things we count and the things we count them with. The next step in the development of counting was to use names for numbers. Saying or thinking the names could count a group of objects: for instance, we say one, two, and three as we count. In the same way it is convenient to use symbols for writing numbers. The ancient Egyptians simply made upright marks from right to left on their papyrus. One was I; two was and so on. This works well enough for counting small numbers of things but it is unwieldy for large numbers. One would have to remember too many number names and write down too many marks. To avoid this, a method of grouping was used. The Egyptians grouped numbers in tens. When they reached nine upright marks they used a different symbol, A , for 10. Ten 10s were written . Many peoples have based their number system on 10, because we have 10 fingers and thumbs. However this is not the only way. The Romans grouped things into fives as well as 10s and their symbol V for five is thought to represent a hand with the fingers together and the thumb outstretched. The symbol X for 10 represents two Vs, one on top of another, with the lower V upside down (X). The Babylonian system involved a base of 60 and although our present system is based on 10, the 60 is preserved in the way we subdivide angles and units of time (60 seconds = one minute, 60 minutes = one hour, and 360° is one complete turn). The present Hindu-Arabic system originated in India. Like the Egyptians we use a base of 10. But we have different symbols for the numbers one to nine. Tens are indicated by moving the numbers one space to the left. The symbol 0 for zero is used to show an empty space. This is known as a positional notation.

Binary numbers

The idea of writing numbers using a positional notation and a zero is so familiar-that we tend to take it for granted. But, in fact, the invention of this system was almost as important as the invention of the alphabet. Its advantage is that it can be used for calculation as well as for recording numbers. To appreciate the efficiency of our number system, you have only to compare a simple sum as we do it with the same sum written in Roman numerals. Our Hindu-Arabic system is decimal; that is, the numbers are based on ten. For instance, 13 579 is a short way of writing 1 ten thousand* 3 thousands + 5 hundreds + 7 tens + 9 units. A ten is a group often units; a hundred is a group often tens; a thousand is ten hundreds. The number is equivalent to (1 x 104) + (3 x 103) + (5x102) + (7xlO)+9. Here 104 stands for 10x10x10x10 and 103 for 10 x 10 x 10. Ten is called the base of the number system. In the same way that we take the positional notation for granted we also take the base often for granted. However, numbers can have any base - if we had six fingers on each hand we might well use a base of 12 - we sometimes do when we talk in dozens and gross. Another system now in use is the binary notation, which has a base of 2.Binary numbers are written using only two symbols, 0 and . To count in binary, start with 1 for one. Two is written as 10; it is read 'one-oh', not ten. Three is 11, four is 100, five is 101, six is 10, seven is 11, eight is 1000, sixteen is 10000, and soon. In the binary system a new digit has to be added at two, four, eight, sixteen and so on - not at ten, hundred, thousand, and so on, as in the decimal system. For instance, the binary number 11111 stands for 1 sixteen+1 eight +1 four+1 two + 1 = 31.Note that four is two twos, eight is two fours, sixteen is two eights, etc. The number can be written (1 x24) + (1 x23) + (1 x22) + (1 x2) +1; in this case 24 stands for 2x2x2x2,2 being the base of the system. The binary system can also be used for calculations - you have only to remember that 1+0=1 ,1+1 = 10,1x0 = 0 and 1x1 = 1. However, the numbers used are usually larger- than their decimal equivalents (compare 11111 with 31). The importance of binary numbers is that they are used in computers: a flow of current signifies 1, no flow signifies 0. This makes calculations very simple.

Calculating machines: abacus to computer

One of the earliest devices for working out calculations was the abacus. It is still used today in some far eastern countries and experts can operate it at a great speed. One type ©f abacus has two frames. Each bead moved up on the bottom frame represents 'one[1] and each bead moved down on the top frame represents 'five'. The positions of the beads represent the numbers. More than a hundred years ago Charles Babbage, an English mathematician, designed an analytical engine for performing calculations. *It* worked in decimal numbers but it was too complicated and cumbersome to build. ENIAC, the first electronic computer, also worked in decimal. Modern computers, however, all work in binary. Binary numbers need only two symbols. An electric current not flowing is represented by 0 and a current flowing is represented by .. In this way a number is converted into a series of electric pulses. Each unit (0 or 1) is called a bit. The modern computer has several parts. First there must be some way of getting information and instructions into the machine. This is the 'input'. A common method is to use a paper tape with groups of holes punched in it. Each group of holes represents a letter or number. A light shining through the holes in the moving tape produces the pulses of current. The numbers are then held in the store. There are various kinds of store. One is the magnetic core, made up of many small pieces of magnetic material and each piece stores one bit, according to which way the material is magnetized. Calculations are performed in the central processing unit (CPU) which contains electronic circuits for adding, subtracting, multiplying, dividing and other mathematical operations. The results are sent out of the computer through the 'output[1]. This may consist of a variety of devices, but often it is an electric typewriter that automatically types out the results onto a roll of paper. The equipment and machines used for input, output and storage are called the hardware. The program, which consists of the instructions telling the CPU what to do with the input, is the software. Computers, which can calculate in minutes what would take a man years to complete, are used in many ways - for storing and sorting information, controlling machines and helping in scientific research.

Weights and measures

Many mathematicians are interested in investigating numbers for the sake of the numbers themselves. Usually, however, the numbers we use refer to numbers of things. Often they refer to measurements, such as metres, seconds or amperes. To measure something there must first be something else to compare it with. The earliest measurements were based on the size of a man's body. The cubit was about the distance from the elbow to the tip of the middle finger. The yard was the distance from the nose to the tip of the outstretched arm. Since men's arms vary in length, accurate measurements have to be based on a permanent standard that is agreeable to everyone Even today there is still confusion, with units of measurement meaning different things. The ton, for example, is 2240 pounds in Britain, but in the United States it is 2000 pounds. To make matters worse the metric ton (or tonne) is 1000 kg. The first step towards a logical system was the metric system introduced by Napoleon in France in the late 1700s. The French wanted to use standards that would not change, so they defined the metre as one ten-millionth of the distance from the North Pole to the equator along a meridian passing through Dunkirk, France. The gram was defined as the mass of one cubic centimeter of water at its freezing point. However, over the years these definitions proved unsatisfactory, and an international committee worked out a system of units to replace them. In 1960, by international agreement, SI units (System International) were introduced and have since been adopted by most countries of the world. The SI system has seven base units (including the metre, second, kilogram and ampere). All other units in scientific work are derived from these base units by simple definitions, and all measurements are now made in these units or in multiples of them. The base units themselves are precisely defined by scientific methods. Only the kilogram remains based on a standard block of metal (platinum-indium) kept at Sevres, near Paris. The metre, for example, is now defined in terms of the wavelength of a certain kind of light emitted by the gas krypton under certain conditions. The adoption of SI units throughout the world will make finance and commerce simpler when the difficulties of changing to it have been over come.

Geometry and triangles

Geometry is one of the oldest branches of mathematics. Ancient Egyptian builders managed to build the Great Pyramid so that the length of its sides are accurate to within two centimetres because they had practical experience with the properties of lengths, angles and shapes. Vertical walls were built by using a plumb line and horizontal surfaces were laid with the help of a water level. The angle between the vertical direction and the horizontal is 90° - a right angle. They also knew a method of making right angles with three rods - one of three units in length, the other of four units and the third of five units. If these are put together they form a triangle in which the angle between the two shorter rods is 90°. It does not matter what units of measurement (such as metres or miles) are used a long as the sides are in the ratio of 3:4:5 - they will always produce a right-angled triangle. Not all triangles contain right angles. One way of classifying triangles is by the lengths of their sides. A triangle whose three sides are equal is called an equilateral triangle. Triangles with two sides equal are called isosceles and those with three unequal sides are called scalene. Triangles are important in the construction of frameworks for roofs and aircraft, because they have the most rigid shape. The ancient Greeks learned the beginnings of geometry from the Egyptians and then worked out a large number of characteristics of triangles and other shapes. In the third century B.C. Euclid, a professor at Alexandria, based his geometry on definitions of points, lines and angles, and also on certain hypotheses. These hypotheses were statements that were assumed to be true under all circumstances; for example, the statement that only one straight line can be drawn through two points. He then showed that other facts (theorems) followed from these hypotheses. The famous theorem of Pythagoras, a Greek mathematician, is a basic law that is true for any triangle containing a right angle. It states that the area of a square drawn on the side (hypotenuse) opposite the right angle is equal to the total area of the squares drawn on the other two sides. For a right-angled triangle with sides 3 and 4 units long, the hypotenuse must be 5 units long, because $4^2 + 3^2 = 5^2$. Other examples of right-angled triangles are those with sides 5, 12 and 13 units long and 7, 24 and 25 units long.

Circles

Geometry is the study of shapes made up of straight lines and also the study of curves. The most familiar curve is the circle. It can be drawn with a compass or by sticking a drawing pin in paper, looping a string over it, attaching a pencil to the other end of the string and moving the pencil around the pin, keeping the string taut. It is obvious from the way that it is drawn that any point on the circle is the same distance from its centre. This distance is called the radius of the circle. Ancient mathematicians thought that the circle was the perfect shape. A circle always has the same form even when it is rotated, which is why such things as wheels and gears are circular. Over two thousand years ago, Eratosthenes, a Greek mathematician, guessed that the Earth was spherical and found a way of measuring its circumference. He noticed that at midday at Cyrene the sun was directly overhead because its rays shone down a deep well. At the same time of day at Alexandria the rays were not vertical, but were inclined at an angle. By measuring this angle he was able to find that the angular distance between Alexandria and Cyrene was 7-2°. He knew distance overland in modern units was 925 km and was able to work out a value of 46250000 metres for the Earth's circumference. The accurate value is 40 089 350 metres. Circles were widely studied in ancient times because of their properties. Mathematicians in Egypt, Babylonia and China knew that the distance around any circle (circumference) is roughly three times its diameter (a straight line passing through the centre of the circle and joining two points on the circumference). In every circle, no matter how small or how large, its circumference divided by the diameter is always the same. This ratio of circumference to diameter is represented by the symbol n, the Greek letter pi. Archimedes found that the value of л was slightly greater than 3 - it is about 3 1/7 - and we often use this figure for rough calculations. For more precise work the value is 3-14159 ... where the decimals go on forever without repeating. Pi is what is known as an irrational number. We do not know its value exactly but can calculate it to any required accuracy -an early computer worked it out to 10 000 decimal places. The circumference of a circle is n x its diameter, or 2nr where r is the length of the radius. The area of a circle is therefore nr^2

Algebra and its language

If a car travels for two hours at 60 miles per hour it covers 120 miles. Similarly, a car moving at 50 miles per hour for three hours travels 150 miles. The distance is obtained by multiplying the velocity by the time. This statement can be written in a much shorter way if symbols are used instead of words. If distance is represented by the letter s, velocity by the letter v, and time by t, then we can write s = vxt. We usually do not bother to include the multiplication sigh and simply write s = vt. This type of expression belongs to algebra, a branch of mathematics which was invented by the Arabs. The word comes from the Arabic 'Algebra' meaning the great art. Algebra is a form of language for writing about numbers and measurements and the relationships between them. Not only is it much shorter than using words but it helps in working out mathematical problems.

A more complicated example would be a problem such as 'in two years' time a man will be twice as old as his son is now. If their total age is 67, how old is the son?' First we translate the words into symbols. If т stands for the man's age in years, then in two years' time he will be $m + 2$ years old. Now we can construct our first equation :$m + 2 = 2s$, where s is the son's age. We now have one equation, but two unknown symbols, i.e. m and s. In order to solve the equation, that is to assign values to the symbols, we must always have the same number of equations as we have unknowns. In this case, therefore, we need one more equation: it is $m + s = 67$.1f $m + 2 = 2s$ we can subtract 2 from each side and get $m= 2s - 2$. We can now use this value of т in the equation $m + s = 67$, thus $2s-2 + s = 67$. Adding up the $2s + s$ on the left-hand side and putting the numbers on the right we get $3s = 69$, or $s = 23$. The son's age, therefore, is 23.

Co-ordinate geometry

In 1637 a French mathematician, Rene Descartes, invented coordinate geometry, a method of combining algebra and geometry which uses graphs to press the relationship between two quantities. First two lines are drawn at right angles to each other. The horizontal line is called the x-axis and the vertical line is called the i-axis.

The point at which the lines cross is called the origin, O, and all distances are measured from this point. The two axes are marked with scales, so that distances upwards and to the right of the origin represent positive values of x and y. Distances downwards and to the left of the origin represent negative values. If we start at the origin and move two units right along the x-axis and three units upwards parallel to the y-axis, we reach a point which is labelled (2,3). These numbers are the co-ordinates of the point: the x-value is always written first. The point (2,3) is different from (3,2). Because this form of mathematics relies on co-ordinates, it is called co-ordinate geometry, and it can be used to represent algebraic equations. The simple equation $y = 3x$, means that when $x = 1$, $y = 3$; when x: = 2, $y = 6$. If we mark the points (1,3) (2,6) between the axes they can be connected by a straight line. Every point on the line is a point at which $y = 3x$. Graphs can illustrate the connection between two quantities. For example a graph is often used for changing a temperature in degrees Celsius (C) into degrees Fahrenheit (F), based on the equation $F = 1\text{-}8C + 32$.The equation determines the type of line produced. In the illustration a graph of the line $y = 2x$ is drawn; it will not slope as much as the line $y = 3x$. The gradient of a line is the distance it rises divided by the distance travelled horizontally :$y = 2x$ has a gradient of 2, $y = 3x$ has a gradient of 3. The graph of the line $y = 3x + 2$ does not pass through the origin. Instead it cuts the j-axis at the point (0,2). In general, all straight lines have an equation of the form $y=mx + c$, where m is the gradient and c is the point at which the line cuts the y-axis. Other more complicated equations lead to different curves. For example x2+y2 = r2 is a circle of radius r with its centre at the origin. It is also possible to use co-ordinate geometry in three dimensions; in this case a z-axis is added to the x- and y-axes.

Calculus

It is easy to find the area of a rectangle. Simply multiply its length by its breadth. However, for a figure with curved sides the method of finding the area is not as easy. The curve in the diagram is part of a parabola with an equation $y^2 = 4x$. One way of finding its area is to draw vertical lines at the points x = I, x = 2, x = 3 and x = 4. This divides the area under the curve into five parts. Now we can construct four rectangles, as in the second diagram. Each rectangle is one unit wide and its height can be found by co-ordinate geometry using the curve's equation. For example, when x = , y = 4x1, and therefore y √4. Thus the area of the smallest rectangle is x √4. The areas of the other rectangles can be found in the same way and all four added together to give a total area of (1 x √4) + (1 x √8) + (1 x √l2) + (1 x √l6). Of course, this area is not exactly the area we require. It is smaller than the true area by the amount colored fen in the diagram. If we were to divide the x-axis into nine narrower rectangles (third diagram) we would get a closer answer and there would be less tan in the diagram. In fact, the more narrow rectangles we take the nearer the sum of their areas approaches the area under the parabola. The total area of the rectangles can never be greater than the area under the curve, but it gets closer and closer to it as we take more and more strips. We say that it tends to a limit at which it equals the parabola's area. If you can imagine adding an infinite number of strips of zero width then this is the limit, at which the approximate area exactly equals the true area. In fact it is possible to work out a formula for the area by using the curve's equation and this idea of limits. Then the area can be calculated from the equation of the curve without having to draw a diagram and make actual measurements. The branch of mathematics in which this method is used is calculus. It was invented in the 17th century independently by the English and German mathematicians Isaac Newton and Gottfried Leibniz. This branch of calculus, concerned with measuring areas and volumes, is integral calculus as it depends on the process of integration, or adding together a large number of small elements. The other branch, differential calculus, is concerned with rates and speeds.

Sets

Ordinary algebra is a form of language for saying things about numbers and the way they are combined. Boolean algebra is a different type of algebra for describing collections of things. It was invented by a 19th-century English mathematician, George Boole. Suppose that in a group of 25 students, 1 7 study mathematics arid 16 study science. Obviously some must be studying both. In fact 8 students (17+16 — 25) study both mathematics and science. In Boolean algebra the full group of students is called the universe set, P. Those studying mathematics are a sub-set, which can be given the symbol M; in the same way S is the sub-set of science students. Boolean algebra has its own system of signs and symbols. Just as numbers are combined by addition, multiplication, etc., so sets are combined in certain ways. The full set of students P consists of a number of individuals P_1 P_2, P_3, etc. This is written (P_1 ,P_2, P_3, etc.) = P. In this case P_1 € M, etc., meaning that PI is a member of the set M. If we write M e P, we mean that the sub-set M is contained in the universe set P. The intersection of the sub-sets M and S is written M n S (read M cap S). It is the set of students who study both mathematics and science. Another example is the intersection of the set of all schoolteachers with the set of all people with red hair: it is the set of all red-haired schoolteachers. The total set of all students is given by the union of M and S. This is written M u S (read M cup S). It is the set of students who are studying either mathematics or science or both. The operations of cap and cup are most easily understood by using Venn diagrams in which a set of things is represented by the area within a circle, and by the areas of the overlapping parts of overlapping circles. The operations of intersection and union are rather like multiplication and addition in arithmetic. If F, G and R are three sets it is possible to show that $F \cap (G \cup K)$ is the same thing as $(F \cap G) \cup (F \cap R)$. You can see this from the Venn diagram. This is like the law that 3 x (2 + 7) = (3 x 2) + (3 x 7). Another basic rule of Boolean algebra is that $F \cup (G \cap R) =-(F \cup G) \cap (F \cup R)$. Note that in arithmetic 3 + (2 x 7) is not the same as (3 + 2) x (3 + 7). Boolean algebra can also be applied to statements in logic as well as sets. Its modern application is in computer programming.

Алгоритм пересказа текста

1. Беглый просмотр текста и ознакомление с его общим смыслом.
2. Более внимательное чтение, определение значений незнакомых слов по контексту или по словарю.
3. Смысловой анализ текста, распределение материала статьи на три группы по степени важности.

1- группа	2-група	3 группа
Наиболее важные сообщения, требующие полного и точного отражения в пересказе	Второстепенная информация, передаваемая в более сокращенном виде.	Малозначимая информация, которую можно опустить

4. Организация отобранного материала, языковая обработка и изложение.

СЛОВА И СЛОВОСОЧЕТАНИЯ ДЛЯ ПЕРЕСКАЗА

Данный текст - the present paper(text)

1. тема - the theme (subject-matter)
2. основная проблема - the main (major) problem
3. цель - the purpose
4. основной принцип - the basic principle
5. проблемы, связанные с - problems **relating to...; problems of**
6. аналогично - similarly; likewise
7. поэтому, следовательно, в результате этого - hence; therefore
8. наоборот - on the contrary
10. тем не менее - nevertheless; still; yet

11. кроме того - besides; also; again; in addition; furthermore
13. сначала - at first
13. далее, затем - next; further; then
14. наконец, итак - finally
15. вкратце - in short; **in brief**

Цель написания текста

1.. The object (purpose) of this text is to present (to discuss, to describe, to show, to develop, to give) ...

2. The text (article) puts forward the idea (attempts to determine) ...

Вопросы, обсуждаемые в тексте

1. The paper (article) discusses some problems relating to (deals with some aspects of,. considers the problem of, presents the basic theory, provides information on, reviews the basic principles of) ... .,'
2. The paper is concerned with (is devoted to ...)

Начало текста

1. The paper begins with a short discussion on (deals firstly with the problem of) ...
2. The first paragraph deals with ...
3. First (at first, at the beginning) the author points out that (notes that, describes) ...

Переход к изложению следующей части текста

1. Then follows a discussion on ...
2. Then the author goes *or,* to the problem of ...

3. The next (following) paragraph deals with (presents, discusses» describes) ...
4. After discussing ... the author turns to ...
5. Next (further, then) the author tries to (indicates that, interesting that) .,.
6 It must be emphasized that (should be acted that, is evident that, is clear that, is Interesting to note that) ...

Конец изложения текста

7. The filial paragraph states (describes, ends with) ...
2. The conclusion is that the problem is ...
3. The author concludes that (summarizes the) ...
4. To sum up (to summarize, to conclude) the author emphasizes (points out, admits) that ...
5. Finally {in the end) the author admits (emphasizes) that ...

Оценка текста

In my opinion (to *my* mind, I think)

The paper is interesting (not interesting, of importance (of little importance), valuable (invaluable), up-to-date (out of date), useful (useless) ...

ЛИТЕРАТУРА

1.1. Основная литература:

1 Английский язык для аспирантов [Электронный ресурс]: учебное пособие / Т.С. Бочкарева [и др.]. − Электрон. текстовые данные. − Оренбург: Оренбургский государственный университет, ЭБС АСВ, 2017. − 109 c. − 978-5-7410-1695-4.
Режим доступа: http://www.iprbookshop.ru/71263.html

2. Слепович В.С. Деловой английский язык = Business English [Электронный ресурс]: учебное пособие / В.С. Слепович. − Электрон. текстовые данные. − Минск: ТетраСистемс, 2012. − 270 c. − 978-985-536-322-5.
Режим доступа: http://www.iprbookshop.ru/28070.html

Режим доступа: http://www.iprbookshop.ru/71263.html

1.2. Дополнительная литература:

1. Кашпарова В.С. Английский язык [Электронный ресурс] / В.С. Кашпарова, В.Ю. Синицын. − Электрон. текстовые данные. − М.: Интернет-Университет Информационных Технологий (ИНТУИТ), 2016. − 118 c. − 2227-8397.
Режим доступа: http://www.iprbookshop.ru/52140.html

2. Лычко, Л. Я. Английский язык для аспирантов. English for Post-Graduate Students [Электронный ресурс] : учебно-методическое пособие по английскому языку для аспирантов / Л. Я. Лычко, Н. А. Новоградская-Морская. — Электрон. текстовые данные. — Донецк : Донецкий государственный университет управления, 2016. — 158 c. — 2227-8397. — Режим доступа: http://www.iprbookshop.ru/62358.html

3. Лукина, Л. В. Курс английского языка для магистрантов. English Masters Course [Электронный ресурс] : учебное пособие для магистрантов по развитию и совершенствованию общих и предметных (деловой английский язык) компетенций / Л. В. Лукина. — Электрон. текстовые данные. — Воронеж : Воронежский государственный архитектурно-строительный университет, ЭБС АСВ, 2014. — 136 c. — 978-5-89040-515-9. — Режим доступа: http://www.iprbookshop.ru/55003.html

4. Сомко, А. С. Профессиональный иностранный язык для специалистов в области компьютерной безопасности [Электронный ресурс] / А. С. Сомко, Е. А. Федорова. — Электрон. текстовые данные. — СПб. : Университет ИТМО, 2016. — 34 c. — 2227-8397. — Режим доступа: http://www.iprbookshop.ru/68059.html

1.3. Методическая литература:

1. New Opportunities Russian Edition Elementary/CDs /Video
Cutting Edge / CDs

2. БонкН.А., ЛевинаИ.И., БонкИ.А. Английскийшагзашагом: курсдляначинающих/Cassettes

3.Полный курс английского языка «REWARD»/ CDs

4. Иностранный язык (Английский язык): Учеб.пособие для практических занятий студентов всех специальностей / сост.: О. Г. Цыганская. - Ставрополь : СКФУ, 2015. - 123 с.

1.4. Перечень ресурсов информационно-телекоммуникационной сети «Интернет», необходимых для освоения дисциплины

1. http://www.bbc.co.uk/home/today/index.shtml - ресурсы и материалы BBC

2. http://www.englishonline.co.uk–EnglishOnline – ресурсы для изучения английского языка

3. http://www.oup.com/elt/oald/– Обновленная и усовершенствованная версия популярного Оксфордского словаря. Словарь содержит 80 000 статей. Вы также можете найти подробные объяснения фразовыхглаголов и идиом, использующих искомое слово. Предлагается версия на CD-ROM

1.5. Программное обеспечение

Специальное программное обеспечение не требуется

2. Материально-техническое обеспечение дисциплины

1. Мультимедийные аудитории, медиатеки, музей лингводидактики
2. Аудиовизуальные средства обучения
3. Доска магнитно-маркерная 1-элементная 120x240
4. Короткофокусный мультимедиа-проектор Epson с настенным креплением и набором кабелей
5. Место ученика лингафонного кабинета "диалог-2"

Видеодвойка "SAMSUNG

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«СЕВЕРО-КАВКАЗСКИЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»

Методические указания
для обучающихся по организации и проведению
самостоятельной работы по дисциплине
«Иностранный язык в сфере профессиональной коммуникации»
для студентов направления подготовки
01.04.02 «Прикладная математика и информатика»
Направленность (профиль):
«Математическое моделирование»

Содержание

Введение

Основной целью самостоятельной работы студентов является повышение исходного уровня владения иностранным языком, достигнутого на предыдущей ступени образования, и овладение студентами необходимым и достаточным уровнем коммуникативной компетенции для решения социально-коммуникативных задач в различных областях бытовой, культурной, профессиональной и научной деятельности при общении с зарубежными партнерами, а также для дальнейшего самообразования.

Исходя из поставленной цели ставятся следующие **задачи:**

- повысить уровень учебной автонономии способности к самообразованию;
- развить когнитивных и исследовательских умения;
- расширить кругозор и повысить общую культуру студентов;
- развить навыки чтения, понимания и перевода литературы по специальности с немецкого языка на русский;
- развить навыки устной речи по литературоведению на немецком языке;
- закрепить лексический и грамматический материала при помощи различных упражнений;
- выработать умения аннотировать и реферировать прочитанный материал;
- выработать умения самостоятельно анализировать философскую, историческую, социологическую, культурологическую и связанную с изучением иностранных языков информацию;
- применять научную терминологию и основные научные категории, формировать общие модели анализа по соответствующим дисциплинам;
- практически владеть системой английского языка и принципами ее функционирования применительно к различным сферам речевой коммуникации, речевого воздействия;
- вести беседу по прочитанному или прослушанному тексту, правильно используя лексический и грамматический минимум;
- кратко передать содержание текста, проанализировать текст, дать его характеристику;
- читать про себя и понимать без перевода на русский язык оригинальный текст средней трудности профессиональной направленности и публицистического жанра;
- писать орфографически правильно в пределах активного лексического минимума.
- помочь студенту наиболее эффективно организовать свою учебно-познавательную деятельность, рационально планировать и осуществлять самостоятельную работу, а также обеспечивать формирование общих умений и навыков самостоятельной деятельности;

- разработать и внедрить отдельные формы самостоятельной работы в процессе обучения иностранному языку, как при направляющем участии преподавателя, так и без него на протяжении всего курса изучения иностранного языка;
- создать психолого-дидактические условия развития интеллектуальной инициативы и мышления на занятиях любой формы.

Самостоятельная работа студентов занимает важное место в учебной и научно-исследовательской деятельности студентов. Без самостоятельной работы невозможно не только овладение любой вузовской дисциплиной, но и формирование специалиста как профессионала. В широком смысле под самостоятельной работой следует понимать совокупность всей самостоятельной деятельности студентов, как в учебной аудитории, так и вне нее, в контакте с преподавателем и в его отсутствие.

Усиление роли самостоятельной работы студентов означает принципиальный пересмотр организации учебно-воспитательного процесса в вузе, который должен строиться так, чтобы развивать умение учиться, формировать у студента способности к саморазвитию, творческому применению полученных знаний, способам адаптации к профессиональной деятельности в современном мире.

Аннотация дисциплины

Наименование дисциплины	**Иностранный язык в сфере профессиональной коммуникации**
Содержание	The Real-Number System. The Field and the Order Axioms. Rational and Irrational Numbers. Signed Numbers. Types of Fractions. Addition and Subtraction. Multiplication and Division. Natural Numbers. What are Imaginary Numbers? Numbers and Fundamental Arithmetical Operations. Counting and Numbers. Calculus.
Реализуемые компетенции	УК-4; УК-5
Результаты освоения дисциплины	**УК-4** **Знать:** – словообразовательную структуру общенаучного и терминологического слоя текста по специализации, лексику делового, национально-культурного общения; лексический минимум иностранного языка общего и профессионального характера; **Уметь:** – работать с профессиональной литературой на иностранном языке в печатном и электронном виде, т.е. овладеть всеми видами чтения (просмотрового, ознакомительного, изучающего, поискового); общаться с зарубежными коллегами на одном из иностранных языков, осуществлять перевод профессиональных текстов **Владеть:** – – навыками профессионально-ориентированного перевода текстов, относящихся к различным видам основной профессиональной деятельности. - культурой иноязычной устной и письменной речи. **УК-5**

	Знать: – грамматические основы иностранного языка, обеспечивающие коммуникацию общего и профессионального характера без искажения смысла при письменном и устном общении; – фонетические, грамматические и лексические структуры устной и письменной речи в определенном объеме; **Уметь:** – общаться с зарубежными коллегами на одном из иностранных языков, осуществлять перевод профессиональных текстов; **Владеть:** – навыками разговорной речи на одном из иностранных языков и профессионально-ориентированного перевода текстов, относящихся к различным видам основной профессиональной деятельности.
Трудоемкость, з.е.	**6**
Формы отчетности	2 семестр – экзамен
Перечень основной и дополнительной литературы, необходимой для освоения дисциплины	
Основная литература	1. Нурутдинова, А.Р. Английский язык для информационных технологий : учебное пособие : в 2 ч. / А.Р. Нурутдинова ; Министерство образования и науки России, Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования «Казанский национальный исследовательский технологический университет». - Казань : Издательство КНИТУ, 2013. - Ч. I. - 300 с. - Библиогр. в кн. - ISBN 978-5-7882-1529-7. - ISBN 978-5-7882-1530-3 (ч. 1) ; То же [Электронный ресурс]. - URL: http://biblioclub.ru/index.php?page=book&id=428093 (10.03.2018). 2. Нурутдинова, А.Р. Английский язык для информационных технологий : учебное пособие : в 2 ч. / А.Р. Нурутдинова ; Министерство образования и науки России, Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования «Казанский национальный исследовательский технологический университет». - Казань : Издательство КНИТУ, 2013. - Ч. II. - 316 с. - Библиогр. в кн. - ISBN 978-5-7882-1529-7. - ISBN 978-5-7882-1531-0 (ч. II ; То же [Электронный ресурс]. - URL: http://biblioclub.ru/index.php?page=book&id=428094 (10.03.2018).
Дополнительная литература	1. Бжиская, Ю. В. Английский язык : информационные системы и технологии : учеб. пособие для вузов / Ю.В. Бжинская, Е.В. Краснова. - Ростов н/Д : Феникс, 2008. - 248 с. : ил. - (Высшее образование). - ISBN 978-5-222-14234-9, экземпляров 10 2. Дудорова, Э. С. Ключ к учебному пособию «Разговорный английский. Практический курс» / Э.С. Дудорова. - Санкт-Петербург : КАРО, 2017. - 144 с. - http://biblioclub.ru/. - ISBN 978-5-

	9925-1220-5, экземпляров неограничено 3. Качалова, К. Н. Практическая грамматика английского языка с упражнениями и ключами / К.Н. Качалова, Е.Е. Израилевич. - М. : ЛадКом, 2011. - 718 с. : прил. - (English). - ISBN 978-5-91336-008-3, экземпляров 5 4. Мюллер, В. К. Новый англо-русский, русско-английский словарь Электронный ресурс / В. К. Мюллер. - Москва : Аделант, 2014. - 512 с. - Книга находится в премиум-версии ЭБС IPR BOOKS. - ISBN 978-5-93642-332-1, экземпляров неограничено

Основными формами работы и контроля студентов являются:

СООБЩЕНИЕ

Сообщение - это прозаическое сочинение небольшого объема и свободной композиции, выражающее индивидуальные впечатления и соображения по конкретному поводу или вопросу и заведомо не претендующее на определяющую или исчерпывающую трактовку предмета.

Цель сообщения состоит в развитии таких навыков, как самостоятельное творческое мышление и письменное изложение собственных мыслей.

Структура и план сообщения

Структура определяется предъявляемыми требованиями:

I. мысли автора по проблеме излагаются в форме кратких тезисов (Т);
II. мысль должна быть подкреплена доказательствами, поэтому за тезисом следуют аргументы (А).

Аргументы - это факты, явления общественной жизни, события, жизненные ситуации и жизненный опыт, научные доказательства, ссылки на мнение ученых и др. Лучше приводить два аргумента в пользу каждого тезиса: один аргумент кажется неубедительным, три аргумента могут "перегрузить" изложение, выполненное в жанре, ориентированном на краткость и образность.

Таким образом, эссе приобретает кольцевую структуру (количество тезисов и аргументов зависит от темы, избранного плана, логики развития мысли):

- вступление; - тезис, аргументы; - тезис, аргументы; - тезис, аргументы; - заключение.

Правила написания сообщения

- Из формальных правил можно назвать только одно - наличие заголовка.
- Внутренняя структура может быть произвольной. Поскольку это малая форма письменной работы, то не требуется обязательное повторение выводов в конце, они могут быть включены в основной текст или в заголовок.
- Аргументация может предшествовать формулировке проблемы. Формулировка проблемы может совпадать с окончательным выводом.
- В отличие от реферата, который адресован любому читателю, поэтому начинается с "Я хочу рассказать о.", а заканчивается "Я пришел к следующим выводам...", эссе - это реплика, адресованная подготовленному читателю (слушателю). То есть человеку, который в общих чертах уже представляет, о чем пойдет речь. Это позволяет автору сосредоточиться на раскрытии нового и не загромождать изложение служебными деталями.

СОБЕСЕДОВАНИЕ

Собеседование - форма учебной деятельности, специальная беседа преподавателя со студентом на темы, связанные с изучаемой дисциплиной, рассчитанная на выяснение объема знаний студента по определенному разделу, теме, проблеме и т. п., позволяющая оценить их умение аргументировать собственную точку зрения, предполагающая всестороннее обсуждение какого-либо вопроса, проблемы или сопоставлении информации, идей, мнений, предложений.

ДОКЛАД

Доклад представляет собой исследование по конкретной проблеме.
Работа по подготовке доклада включает не только знакомство с литературой по избранной тематике, но и самостоятельное изучение определенных вопросов.
Научный доклад может быть подготовлен для выступления на семинарском занятии, на конференции, в рамках проводимого круглого стола.
Подготовка доклада включает несколько этапов работы:

1. Выбор темы доклада
2. Подбор материала
3. Составление плана. Работа над текстом
4. Оформление материалов
5. Подготовка к выступлению

Доклад состоит из следующих частей:

- титульный лист
- оглавление
- введение
- основная часть
- заключение
- список литературы.

Введение
В введении необходимо, прежде всего, объяснить, в чем состоит актуальность данного исследования.

Основная часть
Это, собственно, и есть ваш доклад. Обычно основная часть состоит из нескольких разделов (глав, параграфов), каждый из которых посвящен отдельному аспекту изучаемой темы. У каждой главы, в отличие от введения и заключения, должен быть свой заголовок.

Заключение
В заключении необходимо сделать общие выводы по изученной теме. Они должны быть предельно четкими и конкретными.

Работа над текстом

Составление плана. В дальнейшем, по мере овладения изучаемым материалом, начальный план можно будет дополнять, совершенствовать и конкретизировать.
Работу над текстом будущего выступления можно отнести к наиболее сложному и ответственному этапу подготовки доклада. Именно на этом этапе необходимо произвести анализ и оценку собранного материала, сформулировать окончательный план.
Приступая к работе над текстом доклада, следует учитывать структуру его построения.

РЕФЕРИРОВАНИЕ СПЕЦИАЛЬНОЙ ЛИТЕРАТУРЫ НА ИНОСТРАННОМ ЯЗЫКЕ

Реферирование - краткое изложение содержания текста.
Положительная или критическая оценка изложенных положений дается в зависимости от поставленной цели.

Алгоритм реферирования текста

1. Просмотрите текст, догадайтесь, о чем идет речь в данном тексте,

опираясь на значение знакомых слов.

2. Прочитайте текст еще раз, догадайтесь о значении незнакомых слов по контексту или найдите в словаре.

3. Сделайте смысловой анализ текста, распределив информацию на 3 группы по степени важности:

а) наиболее важная информация, предназначенная для наиболее полного отражения;

б) второстепенная информация для сокращенной передачи;

в) незначительная информация, не требующая отражения.

4. Изложите материал, сделав предварительную языковую обработку.

АННОТИРОВАНИЕ СПЕЦИАЛЬНОЙ ЛИТЕРАТУРЫ НА ИНОСТРАННОМ ЯЗЫКЕ

Аннотация - краткое изложение, состоящее из нескольких фраз изложение текста, раскрывающее его научное и практическое значение без критической оценки.

Тексту аннотации предшествуют библиографические данные, включающие название источника, фамилию автора, год и место издания.

Для составления аннотации необходимо запомнить некоторые клише:

1. The text (article) is headlined…
2. The main idea of the text (article) is…
3. The purpose of the text (article) is to give the reader some information on…
4. The text (article) starts by telling the readers (about, that)…
5. The author writes that…
6. The author states that…
7. The author thinks that…
8. The author stresses that…
9. The author points out that…
10. Further the author reports (says) that…
11. The text (article) goes on to say that…
12. In conclusion…
13. I found the text (article) interesting (important, dull, of no value, too hard to understand…)

ТРЕБОВАНИЯ К ПРЕДСТАВЛЕНИЮ И ОФОРМЛЕНИЮ РЕЗУЛЬТАТОВ СРС

После выполнения СРС студенты представляют:

- конспекты разделов по грамматике;
- результаты изучения в рамках программы курса тем, не выносимых на лекции и семинарские занятия;

- выполненные контрольные упражнения;
- тематические доклады и эссе на проблемные темы;
- творческие переводческие работы;
- индивидуальные словари по изучаемым темам;
- аннотирование и реферирование статей;
- статьи онлайн на изучаемую тематику;
- языковое портфолио.

Во время аудиторной работы проводится тестирование для осуществления промежуточного контроля СРС.

Структура и содержание СРС

Титульный лист - 1 страница:

1) Название образовательного учреждения (выравнивание по центру, заглавные буквы)

2) Самостоятельная работа на тему:

Тема работы. (выравнивание по центру)

3) Выполнил: Ф.И.О. автора работы, факультет, курс, группа

4) Руководитель: должность и звание преподавателя, Ф.И.О. (выравнивание по левому краю)

5) Ставрополь, 20___г. (выравнивание по центру)

Требования к оформлению СРС

Самостоятельная работа выполняется студентом на английском или русском языках (согласно целям заданий) на стандартных листах бумаги белого цвета формата А4.

Текст работы должен быть набран на компьютере (шрифт “Times New Roman”, размер шрифта - 12-14 кегель). Левое поле – 2,5 см.; верхнее, правое, нижнее поля – по 2 см. Выравнивание - по ширине, с выделением всех абзацев.

Все листы должны быть пронумерованы сверху по центру. Титульный лист не нумеруется, а последующий нумеруется за номером 2.

Интервал между строчками – одинарный. Общий объем работы – 12-14 листов (не считая титульного листа).

Работа подшивается постранично в пластиковую папку-скоросшиватель с прозрачной обложкой. Первым подшивается отзыв тьютора, затем – титульный лист и т.д.

ПЛАН-ГРАФИК
выполнения СРС по дисциплине «Иностранный язык в сфере профессиональной коммуникации»

Раздел дисциплины	Неделя семестра	Самостоятельная работа студентов и трудоёмкость (в часах)	Срок сдачи (неделя семестра)	Сроки консультаций	Формы текущего контроля
UNIT I					
Computers: Text A: «What is a computer ?»	1-4	6	4	3	Собеседование
Computers: Text B: «Hardware»	5-8	9	8	7	Доклад
Computers: Text C: «Types of software»	9-12	6	12	11	Аннотирование
Computers: Famous people of science and engineering: Charles Babbage	13-17	6	17	16	Сообщение
Итого за 2 семестр		**27**			
Всего		**27**			

ЛИТЕРАТУРА

Рекомендуемая литература

Основная литература:

1 Английский язык для аспирантов [Электронный ресурс]: учебное пособие / Т.С. Бочкарева [и др.]. − Электрон. текстовые данные. − Оренбург: Оренбургский государственный университет, ЭБС АСВ, 2017. − 109 c. − 978-5-7410-1695-4.
Режим доступа: http://www.iprbookshop.ru/71263.html

2. Слепович В.С. Деловой английский язык = Business English [Электронный ресурс]: учебное пособие / В.С. Слепович. − Электрон. текстовые данные. − Минск: ТетраСистемс, 2012. − 270 c. − 978-985-536-322-5.
Режим доступа: http://www.iprbookshop.ru/28070.html

Режим доступа: http://www.iprbookshop.ru/71263.html

Дополнительная литература:

1. 1. Кашпарова В.С. Английский язык [Электронный ресурс] / В.С. Кашпарова, В.Ю. Синицын. − Электрон. текстовые данные. − М.: Интернет-Университет Информационных Технологий (ИНТУИТ), 2016. − 118 c. − 2227-8397.
2. Режим доступа: http://www.iprbookshop.ru/52140.html
3. 2. Лычко, Л. Я. Английский язык для аспирантов. English for Post-Graduate Students [Электронный ресурс] : учебно-методическое пособие по английскому языку для аспирантов / Л. Я. Лычко, Н. А. Новоградская-Морская. — Электрон. текстовые данные. — Донецк : Донецкий государственный университет управления, 2016. — 158 c. — 2227-8397. — Режим доступа: http://www.iprbookshop.ru/62358.html
4. 3. Лукина, Л. В. Курс английского языка для магистрантов. English Masters Course [Электронный ресурс] : учебное пособие для магистрантов по развитию и совершенствованию общих и предметных (деловой английский язык) компетенций / Л. В. Лукина. — Электрон. текстовые данные. — Воронеж : Воронежский государственный архитектурно-строительный университет, ЭБС АСВ, 2014. — 136 c. — 978-5-89040-515-9. — Режим доступа: http://www.iprbookshop.ru/55003.html
5. 4. Сомко, А. С. Профессиональный иностранный язык для специалистов в области компьютерной безопасности [Электронный ресурс] / А. С. Сомко, Е. А. Федорова. — Электрон. текстовые данные. — СПб. : Университет ИТМО, 2016. — 34 c. — 2227-8397. — Режим доступа: http://www.iprbookshop.ru/68059.html

Методическая литература:

1 .New Opportunities Russian Edition Elementary/CDs /Video

2. Cutting Edge / CDs

3. Бонк Н.А., Левина И.И., Бонк И.А. Английский шаг за шагом: курс для начинающих/Cassettes
4. Полный курс английского языка «REWARD»/ CDs

Интернет-ресурсы:

1. http://www.bbc.co.uk/home/today/index.shtml - ресурсы и материалы BBC
2. http://www.englishonline.co.uk–EnglishOnline – ресурсы для изучения английского языка
3. http://www.oup.com/elt/oald/– Обновленная и усовершенствованная версия популярного Оксфордского словаря. Словарь содержит 80 000 статей. Вы также можете найти подробные объяснения фразовых глаголов и идиом, использующих искомое слово. Предлагается версия на CD-ROM

11. Перечень информационных технологий, используемых при осуществлении образовательного процесса по дисциплине, включая перечень программного обеспечения и информационных справочных систем

Специального программного обеспечения не требуется

12. Описание материально-технической базы, необходимой для осуществления образовательного процесса по дисциплине

6. Мультимедийные аудитории, медиатеки, музей лингводидактики
7. Аудиовизуальные средства обучения
8. Доска магнитно-маркерная 1-элементная 120x240
9. Короткофокусный мультимедиа-проектор Epson с настенным креплением и набором кабелей
10. Место ученика лингафонного кабинета "диалог-2"

Видеодвойка "SAMSUNG