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имени Франциска Скорины»



Г. Н. ПЕТУХОВА

# АНГЛИЙСКИЙ ЯЗЫК

## ЗАДАНИЯ К КОНТРОЛЬНЫМ РАБОТАМ

*для студентов заочного факультета специальности 1- 31 03 01 02 «Математика (научно-педагогическая деятельность)»*



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П 314 Английский язык : задания к контрольным работам для студентов заочного факультета специальности 1-31 03 01 02 «Математика (научно-педагогическая деятельность)» / Г. Н. Петухова; М-во образования РБ, Гомельский государственный университет им. Ф. Скорины. – Гомель : ГГУ им. Ф. Скорины, 2008 – 47 с.

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Целью заданий к контрольным работам является оказание помощи студентам заочного факультета в их самостоятельной работе над развитием практических навыков правильного чтения и перевода научно-популярной литературы на английском языке, в приобретении умений и навыков понимать общее содержание прочитанной статьи без обязательного и точного перевода всех предложений текста. Задания включают 4 контрольных работы и направлены на повышение эффективности самостоятельной работы студентов. Материал для чтения взят из различных периодических изданий.

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## Содержание

## Введение

Практическое владение английским языком в условиях обучения на неязыковых заочных факультетах означает умение читать со словарем литературу на английском языке по специальности. Задания к контрольным работам ставят своей целью оказание помощи студентам-заочникам в их самостоятельной работе над развитием практических навыков правильного чтения и перевода научно-популярной литературы на английском языке, в приобретении умений и навыков понимать общее содержание прочитанной статьи без обязательного и точного перевода всех предложений текста. Для развития навыков чтения научной литературы по специальности представлены задания на овладение грамматическим формами и оборотами, необходимыми для перевода и понимания текста, а также задания на накопление словарного запаса. Предлагаемые задания строятся на основе самостоятельной работы студента. Поскольку лица, поступающие на заочный факультет, имеют иногда значительный перерыв в учебе и уровень их подготовки по иностранному языку различен, в задания включен весь грамматический и лексический материал, необходимый для чтения литературы по специальности.

Тематика текстов включает сведения из истории математики и описание ее основных проблем. Тексты заимствованы из специальной научной литературы по математике на английском языке.

Приобретенные знания, умения и навыки должны обеспечить будущему специалисту возможность использовать в своей работе специальную литературу на английском языке, т. е. умение самостоятельно читать английские тексты по специальности, отбирать полезную для работы информацию.

## Выполнение контрольных заданий и оформление контрольных работ

Количество контрольных заданий, выполняемых на каждом курсе, устанавливается учебным планом университета. В письме кафедры иностранных языков студенты получают график выполнения контрольных работ.

Каждое контрольное задание в данном пособии предлагается в трёх вариантах. Студент должен выполнить один из трех вариантов соответствующей контрольной работы.

Вариант, который студент должен выполнить, указывается

преподавателем. Все остальные варианты можно использовать в качестве материала для дополнительного чтения и для подготовки к экзамену.

Выполнять письменные контрольные работы следует в отдельной тетради. На обложке тетради напишите свою фамилию, группу, номер контрольной работы.

Контрольные работы должны выполняться чернилами, аккуратно, четким почерком. При выполнении контрольной работы оставляйте в тетради широкие поля для замечаний, объяснений и методических указаний рецензента.

Материал контрольной работы следует располагать в тетради по следующему образцу (таблица 1):

Таблица 1

| Левая страница | | Правая страница | |
|---|---|---|---|
| **Поля** | **Английский текст** | **Русский текст** | **Поля** |

Задания контрольной работы должны быть выполнены в той последовательности, в которой они даны в настоящем пособии.

В каждом контрольном задании выделяются один или два абзаца для проверки умения читать без словаря, понимать основную мысль, изложенную в абзаце. После текста дается контрольный вопрос, с помощью которого проверяется, насколько правильно и точно вы поняли мысль, изложенную в абзаце (или абзацах). Ниже может предлагаться несколько вариантов ответов. Среди этих вариантов необходимо найти тот, который наиболее правильно и четко отвечает на поставленный вопрос.

Выполненные контрольные работы направляйте для проверки и рецензирования в учреждение образования в установленные сроки.

Если контрольная работа выполнена без соблюдения указаний или не полностью, она возвращается без проверки.

## Исправление ошибок на основе рецензий

При получении от рецензента проверенной контрольной работы внимательно прочитайте рецензию, ознакомьтесь с замечаниями рецензента и проанализируйте отмеченные в работе ошибки.

Руководствуясь указаниями рецензента, проработайте еще раз учебный материал. Все предложения, в которых были обнаружены

орфографические и грамматические ошибки или неточности перевода, перепишите в исправленном виде в конце данной контрольной работы.

Только после того, как будут выполнены все указания рецензента и исправлены все ошибки, можно приступить к изучению материала очередного контрольного задания и его выполнению.

Отрецензированные контрольные работы являются учебными документами, которые необходимо сохранять; помните о том, что во время зачета или экзамена производится проверка усвоения материала, вошедшего в контрольные работы.

## КОНТРОЛЬНАЯ РАБОТА 1

Множественное число существительных.

Притяжательный падеж существительных.

Глаголы в 3-м лице единственного числа группы Simple в действительном залоге.

Глагол to be. Структура there / to be

Формы сравнения у прилагательных.

Числительные.

### ВАРИАНТ 1

**Упражнение 1**

Определите, что обозначает окончание "s". Переведите предложения на русский язык.

1 In the Hindu–Arabic numeration system we use five digits.
2 She usually solves a lot of equations while doing her homework.
3 Engineers' work aims at practical use of new theories.
4 Division and subtraction are inverse operations
5 The remainder equals 5.
6 Our University's team usually takes first places in different contests in programming.

**Упражнение 2**

Употребите соответствующую форму глагола to be (am, is are, was, were, shall/will be). Переведите предложения на русский язык.

1 … there … a remainder if you divide 36 by 6?
2 Addition … the inverse operation of multiplication.
3 There … some tests in mathematics last week.
4 I… a student now.
5 In the expression 5x2, the 5 and the 2 … factors.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на структуру there to be.

1 There are two very important facts that must be remembered about di-

vision.

2 There is no need in this test now,
3 There were a few outstanding scientists at the conference yesterday.
4 There exists only one solution of this problem.

**Упражнение 4**

Переведите предложения на русский язык, обращая внимание на формы прилагательных.

1 He is the most intelligent student in the group.
2 I don't know as many people as you do.
3 The more expensive the hotel, the better the service.
4 It is becoming harder and harder to find the necessary solution.
5 Our teacher is an intelligent young man.

**Упражнение 5**

Используйте соответствующие формы прилагательных.

1 Our test was … but this one is much … (difficult).
2 It is … to solve this equation with the help of computer (fast).
3 …you have, … you want (much/many).
4 That was … theorem I've ever seen (interesting).

**Упражнение 6**

Письменно переведите следующие числительные на английский язык.

1 Количественные числительные: 100, 128, 14, 1543, 19, 2857000.
2 Порядковые числительные: 1, 2, 3, 55, 120.
3 Даты: 1945, 1793, 1156, 2005.
4 Дроби: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{23}{8}$, $\frac{4}{5}$, $5\frac{3}{4}$.
5 Десятичные дроби: 0,25; 3,48; 25,18.
6 Вес: $\frac{1}{2}$ тонны.
7 Телефонный номер: 128-35-96.

**Упражнение 7**

Прочитайте текст и выполните послетекстовые упражнения.

## WHAT IS MATHEMATICS?

### PART 1

"Mathematics" is a Greek word, and, by origin or etymologically, it means "something that must be learnt or understood", perhaps "acquired knowledge" or "knowledge acquirable by learning" or "general knowledge". The word "maths" is a contraction of all these phrases. The celebrated Pythagorean School in ancient Greece had both regular and incidental members. The incidental members were called "auditors"; the regular members were named "mathematicians" as a general class and not because they specialized in maths; for them maths was a mental discipline of science learning. What is maths in the modern sense of the term, its implications and connotations? There is no neat, simple, general and unique answer to this question.

Maths as a science, viewed as a whole, is a collection of branches. The largest branch is that which builds on the ordinary whole numbers, fractions, and irrational numbers, or what collectively, is called the real number system. Arithmetic, algebra, the study of functions, the calculus, differential equations, and various other subjects which follow the calculus in logical order are all developments of the real number system. This part of maths is termed the maths of number. A second branch is geometry consisting of several geometries. Maths contains many more divisions. Each branch has the same logical structure: it begins with certain concepts, such as the whole numbers or integers in the maths of number, and such as point, line and triangle in geometry. These concepts must verify explicitly stated axioms. Some of the axioms of the maths of number are the associative, commutative, and distributive properties and the axioms about equalities. Some of the axioms of geometry are that two points determine a line; all right angles are equal, etc. From the concepts and axioms theorems are deduced. Hence, from the standpoint of structure, the concepts, axioms and theorems are the essential components of any compartment of maths. Students must see the interrelationships of the various areas and the importance of maths for other domains. Knowledge is not an additive but an organic whole, and maths is an inseparable part of that whole.

**a)** Переведите письменно второй абзац текста.
**б)** Дайте ответ письменно на следующие вопросы:
1 What means the word "Mathematics"?
2 What is the largest branch of Maths?
**c)** Поставьте все виды вопросов к следующему предложению:

The celebrated Pythagorean School in ancient Greece had both regular and incidental members.

## ВАРИАНТ 2

**Упражнение 1**

Определите, что обозначает окончание "s". Переведите предложения на русский язык.

1 You are placing the plus sign between these numerals.
2 The famous Gauss's investigation is the constructability of regular polygons.
3 The decimal system of numeration uses only ten digits.
4 These digits may be used in different combinations.
5 This laboratory houses interesting devices.
6 These pairs of natural numbers are to be multiplied.

**Упражнение 2**

Употребите соответствующую форму глагола to be (am, is are, was, were, shall/will be). Переведите предложения на русский язык.

1 Einstein … an extremely talented man and a great thinker of the 20th century.
2 The mechanical calculating machine … one of the greatest achievements of mankind.
3 There … some difficult equations in your test next week.
4 I … the best programmer in my group now.
5 This week we have bought some computers because the old ones … not powerful.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на структуру there to be.

1 There are modern machines that can take in, record and store information.
2 There were three other classical Greek problems: to trisect an arbitrary given angle, to double a given cube, to square the circle.
3 There exists a variety of construction problems in geometry.

4 There will be some difficult equations in this theory.

**Упражнение 4**

Переведите предложения на русский язык, обращая внимание на формы прилагательных.

1 It is becoming more and more difficult to find a job.
2 The more equations you use, the more difficult the proof.
3 This is the fastest computer I've ever seen.
4 This software is an expensive at that one.
5 The less you know, the less you forget.

**Упражнение 5**

Используйте соответствующие формы прилагательных.

1 It was … equation I've ever solved. (difficult)
2 I was disappointed that my exam results were so … (bad)
3 The examination was … than we expected. (easy)
4 At first I couldn't say which theorem was ... they were all …, but now I see that the last theorem was … (interesting)

**Упражнение 6**

Письменно переведите следующие числительные на английский язык.

1 Количественные числительные: 6351, 100, 3, 243876.
2 Порядковые числительные: 1, 2, 3, 49, 765.
3 Даты: 1812, 1984, 1083, 2000.
4 Дроби: $\frac{1}{5}$, $\frac{4}{7}$, $\frac{2}{4}$, $5\frac{7}{9}$.
5 Десятичные дроби: 8,23; 0,14; 187,23.
6 Вес: $\frac{5}{6}$ тонны.
7 Телефонный номер: 638-29-15.

**Упражнение 7**

Прочитайте текст и выполните послетекстовые упражнения.

## WHAT IS MATHEMATICS?

## PART 2

The full significance of maths can be seen and taught only in terms of its intimate relationships to other fields of knowledge. If maths is isolated from other provinces, it loses importance.

The basic concepts of the main branches of maths are abstractions from experience, implied by their obvious physical counterparts. But it is noteworthy, that many more concepts are introduced which are, in essence, creations of the human mind with or without any help of experience. Irrational numbers, negative numbers and so forth are not wholly abstracted from the physical practice, for the man's mind must create the notion of entirely new types of numbers to which operations such as addition, multiplication, and the like can be applied. The notion of a variable that represents the quantitative values of some changing physical phenomena, such as temperature and time, is also at least one mental step beyond the mere observation of change. The concept of a function, or a relationship between variables, is almost totally a mental creation. The more we study maths, the more we see that the ideas and conceptions involved become more divorced and remote from experience, and the role played by the mind of the mathematician becomes larger and larger. The gradual introduction of new concepts which more and more depart from forms of experience finds its parallel in geometry and many of the specific geometrical terms are mental creations.

As mathematicians, nowadays working in any given branch discover new concepts, which are less and less drawn from experience and more and more from human mind, the development of concepts is progressive and later concepts are built on earlier notions. These facts have unpleasant consequences. Because the more advanced ideas are purely mental creations rather than abstractions from physical experience and because they are defined in terms of prior concepts, it is more difficult to understand them and illustrate their meaning, even for a specialist in some other province of maths. Nevertheless, the current introduction of new concepts in any field enables maths to grow rapidly indeed; the growth of modern maths is, in part, due to the introduction of new concepts and new systems of axioms.

**а)** Переведите письменно второй абзац текста.

**б)** Дайте ответ письменно на следующие вопросы:

1 What are the basic concepts of the main branches of maths?

2 What concepts do mathematicians discover nowadays?

**c)** Поставьте все виды вопросов к следующему предложению:

The current introduction of new concepts in any field enables maths to grow rapidly.

## ВАРИАНТ 3

**Упражнение 1**

Определите, что обозначает окончание"s". Переведите предложения на русский язык.

1 Scientists all over the world met this Einstein's work with respect and surprise.

2 In all branches of mathematics you need to write many sentences about numbers.

3 The relation of equality between two numbers satisfies these basic axioms for the numbers *a*, *b* and *c*.

4 Peano's axioms are organized in the following way.

5 Zero seems like emptiness, like nothing.

6 The article concerns the contributions of Russian mathematics to the theory of probability.

**Упражнение 2**

Употребите соответствующую форму глагола to be (am, is are, was, were, shall/will be). Переведите предложения на русский язык.

1 However many times the experiment is repeated, the final velocity … the same.

2 Some centuries ago Peano … the first to organize these laws in axiomatic form.

3 It … clever enough to analyze this problem.

4 It … impossible for you to write a test next week.

5 In some years I … a teacher of mathematics.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на структуру there to be.

1 There must be a number of statements called axioms.

2 There is nothing wrong about writing a false sentence.

3 There exist false statements in mathematics.

4 There are some ways of constructing a model of 3-dimensional universe.

**Упражнение 4**

Переведите предложения на русский язык, обращая внимание на формы прилагательных.

1 If we are interested to know which of the two numerals is … we use the conventional symbols (<, >). (great)

2 This theorem is … than the previous one. (interesting)

3 This is … definition given. (correct and concise)

4 Is this programming language … that one? (difficult)

**Упражнение 5**

Используйте соответствующие формы прилагательных.

1 If you want to show that 6 is ... than 7 you will write it in the following way: 6 < 7. (little)

2 The … we read, the … we know. (many / much)

3 Gauss is one of the … mathematicians of Germany. (outstanding)

4 Mathematical analysis is … differential equations. (difficult)

**Упражнение 6**

Письменно переведите следующие числительные на английский язык.

Количественные числительные: 5, 23, 128, 8394, 8467526.

Порядковые числительные: 1, 2, 3, 15, 33, 187.

Даты: 1129, 1912, 2001, 1345.

Дроби: $\frac{5}{7}$, $\frac{1}{6}$, $5\frac{4}{9}$, $\frac{2}{3}$.

Десятичные дроби: 0,42; 6,18; 39,51.

Вес: $\frac{3}{4}$ тонны.

Телефонный номер: 153-29-67.

**Упражнение 7**

Прочитайте текст и выполните послетекстовые упражнения.

## WHAT IS MATHEMATICS?

### PART 3

Axioms constitute the second major component of any branch of maths. Up to the 19th century axioms were considered as basic self-evident truths about the concepts involved. We know now that this view ought to be given up. The objective of math activity consists of the' theorems deduced from a set of axioms. The amount of information that can be deduced from some sets of axioms is almost incredible. The axioms of number give rise to the results of algebra, properties of functions, the theorems of the calculus, the solution of various types of differential equations. Math theorems must be deductively established and proved. Much of the scientific knowledge is produced by deductive reasoning: new theorems are proved constantly, even in such old subjects as algebra and geometry and the current developments are as important as the older results.

Growth of maths is possible in still another way. Mathematicians are sure now that sets of axioms which have no bearing on the physical world should be explored. Accordingly, mathematicians nowadays investigate algebras and geometries with no immediate applications. There is, however, some disagreement among mathematicians as to the way they answer the question: Do the concepts, axioms, and theorems exist in some objective world and are they merely detected by man or are they entirely human creations? In ancient times the axioms and theorems were regarded as necessary truths about the universe already incorporated in the design of the world. Hence each new theorem was a discovery, a disclosure of what already existed. The contrary view holds that maths, its concepts, and theorems are created by man. Man distinguishes objects in the physical world and invents numbers and numbers names to represent one aspect of experience. Axioms are man's generalizations of certain fundamental facts and theorems may very logically follow from the axioms. Maths, according to this viewpoint, is a human creation in every respect. Some mathematicians claim that pure maths is the most original creation of the human mind.

**a)** Переведите письменно первый абзац текста.
**б)** Дайте ответ письменно на следующие вопросы:
1 What do the axioms of number give rise to?
2 What do mathematicians investigate nowadays?
**c)** Поставьте все виды вопросов к следующему предложению:
Man distinguishes objects in the physical world.

## Образец выполнения заданий контрольной работы 1

### Упражнение 1

| | |
|---|---|
| The department teaches in all major subject branches in all modern maths. | Факультет обучает всем основным направлениям современной математики. |
| teaches | 3-е лицо, ед. число от глагола to teach |
| branches | мн. число им. существительного |

### Упражнение 2

| | |
|---|---|
| The Pythagorean theorem is the theorem everybody is familiar with. | Теорема Пифагора – это теорема, с которой знаком каждый. |
| is | 3-е лицо, ед. число от глагола to be |

## КОНТРОЛЬНАЯ РАБОТА 2

1 Все временные формы глагола в действительном залоге.

2 Условные предложения. Сослагательное наклонение.

3 Функции глаголов to be, to have, to do, слов it, that (those), one (ones)

4 Типы вопросительных предложений.

### ВАРИАНТ 1

**Упражнение 1**

Определите видовременную форму глаголов и переведите предложения на русский язык.

1 Leibnitz was doing his research on the simplest numeration system during the latter part of the 17th century.

2 Einstein made some revolutionary discoveries in science.

3 The scientists have just changed the order of the whole process.

4 He has been working at the problem since last year.

5 They know nothing about the theory of relativity.

6 I shall be speaking about the numeration system at the lesson at this time tomorrow.

7 He will have solved this problem by the end of the week.

**Упражнение 2**

Дайте ответ на следующие вопросы, используя условные предложения.

1 What will you do if we have time tomorrow?

2 What would you do if you couldn't solve the equation?

3 What would you do if he were in the lab?

4 What would you have done if they had asked you to take part in the research?

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на сослагательное наклонение и условные предложения.

1 Were he there tomorrow, he would explain everything.

2 But for her, we wouldn't learn the theorem.

3 He would have read his paper at the seminar provided he had been given more time.

4 We shall perform all the necessary operations provided he helps us.

5 I wouldn't have agreed to take part in your investigation unless I had been sure of its importance.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на перевод глаголов to be, to have, to do.

1 Axioms require no proof but theorems do.

2 Where is he attending the conferencc?

3 I am to solve these equations.

4 He had to write these programs by the end of the term.

5 Did he change the signs in both sides of the equation?

6 Some of the algebraic laws do hold for the situation under consideration.

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на перевод слов it, that, one.

1 It was my science adviser who made me change my mind.

2 One should know four basic operations of Arithmetic.

3 This computer is more powerful than that one.

4 It takes the computer some seconds to solve these difficult equations.

5 It is impossible to imagine our life without computers.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## FOUR BASIC OPERATIONS OF ARITHMETIC

We cannot live a day without numerals. Numbers and numerals are everywhere. In a numeration system numerals are used to represent numbers, and the numerals are grouped in a special way. The numbers used in our numeration system are called digits.

In our Hindu-Arabic system we use only ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 to represent any number. These digits may be used in various combinations.

Thus, for example, 1, 2, and 3 are used to write 123, 213, 132 and so on.

A very simple way to say that each of the numerals names the same number is to write an equation – a mathematical sentence that has an equal sign (=) between these numerals. For example, the sum of the numbers 3 and 4 equals the sum of the numbers 5 and 2. In this case we say: three plus four (3 + 4) is equal to five plus two (5 + 2). One more example of an equation is as follows: the difference between numbers 3 and 1 equals the difference between numbers 6 and 4. That is three minus one (3 – 1) equals six minus four (6 – 4). Another example of an equation is 3 + 5 = 8. In this case you have three numbers. Here you add 3 and 5 and get 8 as a result. 3 and 5 are addends (or summands) and 8 is the sum. There is also a plus (+) sign and a sign of equality (=). They are mathematical symbols.

Now let us turn to the basic operations of arithmetic. There are four basic operations that you all know of. They are addition, subtraction, multiplication and division. In arithmetic an operation is a way of thinking of two numbers and getting one number. An equation like 7 – 2 = 5 represents an operation of subtraction. Here seven is the minuend; and two is the subtrahend. As a result of the operation you get five. It is the difference, as you remember from the above. 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 must be 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 and 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.

a) The quotient is 0 (zero) whenever the dividend is 0 and the divisor is not 0. That is, 0: $n$ is equal to 0 for all values of $n$ except $n=0$.

b) Division by 0 is meaningless. If you say that you cannot divide by 0 it really means that division by 0 is meaningless. That is, $n : 0$ is meaningless for all values of $n$.

**а)** Переведите письменно 1, 4, 6 абзацы текста.
**б)** Дайте ответ письменно на следующие вопросы:
1 What are inverse operations?
2 What is a remainder?
3 What are two important facts that must be remembered about division?
**с)** Поставьте все виды вопросов к следующему предложению:
The multiplicand and the multiplier are names for factors.

## ВАРИАНТ 2

**Упражнение 1**
Определите видовременную форму глаголов и переведите предложения на русский язык.

1 The numbers most probably invented were one and two.
2 This philosophy is to a large extent unscientific and useless.
3 Construction problems have always been a favourite subject in geometry.
4 The circle with the centre $(x, y)$ and radius $r$ will be tangent to the three given circles.
5 – What are you doing?
– I'm reading the text about construction problems.
– Oh, I know. Construction problems have always been a favourite subject in geometry.
6 I have been studying this problem for 5 years already.
7 At the age of 17 Gauss investigated the construction of regular $n$-gons (polygons with $n$ sides) where $n$ is a prime number.

**Упражнение 2**
Дайте ответ на следующие вопросы, используя условные предложения.

1 What would you do if you knew the theorem?
2 What figures will you construct if you have a ruler and compass only?
3 What would you have done if they had met you in the lab?
4 What would you do if you could prove Fermat's last theorem?

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на сослагательное наклонение и условные предложения.

1 He insists that the computer should be brought in a week.
2 If I were you I should print this document immediately.
3 But for the professor, they wouldn't learn the theorem.
4 Were she more intelligent she would solve the problem.
5 If he had used this formula he wouldn't have made this mistake.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на перевод глаголов to be, to have, to do.

1 Ruler and compass are the simplest instruments to make a drawing.
2 An equation has as many roots as its degree.
3 The Italian Luca Picioli did apply (1494) the rule of false position.
4 I am to write the program.
5 Did Diophantus make a fresh start in algebra?

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на перевод слов it, that, one.

1 It was the Greeks who formed maths as a scientific discipline.
2 One should not confuse the postulate with the definition.
3 Lobachevsky – one of the greatest Russian mathematicians – revolutionized the science of space and objects in space.
4 After the days of Lobachevsky it became the fashion to challenge axioms.
5 Your proof is more elegant than that of the rest of the students.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## CLOSURE PROPERTY

If we add two natural numbers, the sum will also be a natural number. For example, 5 is a natural number and 3 is a natural number. The sum of these

two numbers, 8, is also a natural number. Following are other examples in which two natural numbers are being added and the sum is another natural number. 19 + 4 = 23 and only 23; 6 + 6 = 12 and only 12. In fact, if you add any two natural numbers, the sum is again a natural number. Because this is true, we say that the set of natural numbers is closed under addition.

Notice that in each the above equation we were able to name the sum. That is, the sum of 5 and 3 exists or there is a number which is the sum of 19 and 4. In fact, the sum of any two numbers exists. This is called the existence property.

Notice also that if you are to add 5 and 3, you will get 8 and only 8 and not some other number. Since there is one and only one sum for 19 + 4, we say that the sum is unique. This is called the uniqueness property.

Both uniqueness and existence are implied in the definition of closure.

Now, let us state the closure property of addition.

If $a$ and $b$ are numbers of a given set, then $a + b$ is also a number of that same set. For example, if $a$ and $b$ are any two natural numbers, then $a + b$ exists, it is unique, and it is again a natural number.

If we use the operation of subtraction instead of the operation of addition, we shall not be able to make the statement we made above. If we are to subtract natural numbers, the result is sometimes a natural number, and sometimes not. 11 – 6 = 5 and 5 is a natural number, while 9 – 9 = 0 and 0 is not a natural number.

Consider the equation $4 - 7 = n$. We shall not be able to solve it if we must have a natural number as an answer. Therefore, the set of natural numbers is not closed under subtraction.

What about the operation of multiplication? Find the product of several pairs of natural numbers. Given two natural numbers, is there always a natural number which is the product of the two numbers?

Every pair of natural numbers has a unique product which is again a natural number. Thus the set of natural numbers is closed under multiplication.

In general, the closure property may be defined as follows: if $x$ and $y$ are any elements, not necessarily the same, of set $A$ ($A$ capital) and * (asterisk) denotes an operation *, then set $A$ is closed under the operation asterisk if ($x * y$) is an element of set $A$.

To summarize shall say that there are two operations, addition and multiplication, for which the set of natural numbers is closed. Given any two natural numbers $x$ and $y$, $x + y$ and are again natural numbers. This implies that the sum and the product of two natural numbers exist. It so happens that with the set of natural numbers (but not with every mathematical system) the results of the operations of addition and multiplication are unique.

It should be pointed out that it is practically impossible to find 'the sum or the product of *every* possible pair of natural numbers. Hence, we have to accept the closure property without proof, that is, as an axiom.

**а)** Переведите письменно 3, 11, 12, 13 абзацы текста.
**б)** Ответьте письменно на следующие вопросы:
1 What properties are implied in the definition of closure?
2 What product has every pair of natural numbers?
3 How may the closure property be defined?
**с)** Поставьте все виды вопросов к следующему предложению:
The set of natural numbers is not closed under subtraction.

## ВАРИАНТ 3

**Упражнение 1**
Определите видовременную форму глаголов и переведите предложения на русский язык.

1 In algebra, it was the problem of solving equations of degree 5 and higher which led to this new way of thinking.
2 Any algebraic equation has roots and it doesn't matter whether its coefficients are real or imaginary.
3 Since the days of Euclid, geometry has been the prototype of an axiomatized discipline.
4 When we prove theorems from postulates or other theorems, we are studying the way the geometric facts are related to each other.
5 This method has been the most successful so far invented.
6 I had been studying the question of independence of the individual axioms for three years.
7 Peano's axioms express in a very clear way the essential principles about the natural numbers.

**Упражнение 2**
Дайте ответ на следующие вопросы, используя условные предложения.

1 What will you do if the professor asks you to prove the theorem?
2 What would you have done if you have learned this news before?
3 What would you do if you had a supercomputer?
4 What will you do if you pass all the exams successfully?

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на сослагательное наклонение и условные предложения.

1 It is necessary that they should apply the new method.
2 If he knew the theorem he would get 5 at the exam.
3 The man repaired the computer as if he were competent in hardware.
4 He would have solved the equations provided he had given more time.
5 If we receive the necessary data we shall inform you.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на перевод глаголов to be, to have, to do.

1 To make sure that the result you have obtained does agree with the expected ones, check it.
2 If a rectangle has a pair of congruent sides, then it is a square.
3 The student had to prove the theorem.
4 A "construction" is drawing geometric figures with a high degree of accuracy.
5 I am to visit this conference.
6 Don't mathematicians define this basic theorem?

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на перевод слов it, that, one.

1 One can in theory prove any theorem directly from the axioms.
2 It was in ancient Greece that the first math, astronomical and physical theories originated and developed.
3 These proofs are valid but try to establish more rigorous ones.
4 The proofs by deduction are much more rigorous than that of by induction.
5 The Greeks had only one space and only one geometry.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## DECIMAL NUMERALS

In our numeration system we use ten numerals called digits. These digits are used over and over again in various combinations. Suppose, you have been given numerals 1, 2, 3 and have been asked to write all possible combinations of these digits. You may write 123, 132, 213 and so on. The position in which each digit is written affects its value.

But suppose you have been given a numeral 587.9 where 9 has been separated from 587 by a point, but not by a comma. The numeral 587 names a whole number. The sign (.) is called a decimal point. All digits to the left of the decimal point represent whole numbers. All digits to the right of the decimal point represent fractional parts of 1.

The place-value position at the right of the ones place is called tenths. You obtain a tenth by dividing 1 by 10. Such numerals like 687.9 are called decimals.

You read .2 as two tenths. To read .0054 you skip two zeroes and say fifty four ten thousandths.

Decimals like .666..., or .242424..., are called repeating decimals. In a repeating decimal the same numeral or the same set of numerals is repeated over and over again indefinitely.

We can express rational numbers as decimal numerals.

The digits to the right of the decimal point name the numerator of the fraction, and the number of such digits indicates the power of 10 which is the denominator.

In our development of rational numbers we have named them by fractional numerals. We know that rational numerals can just as well be named by decimal numerals.

Before performing addition with fractional numerals, the fractions must have a common denominator. This is also true of decimal numerals.

When multiplying with fractions, we find the product of the numerators and the product of denominators. The same procedure is used in multiplication with decimals.

Division of numbers in decimal form is more difficult to learn because there is no such simple pattern as has been observed for multiplication.

Yet, we can introduce a procedure that reduces all decimal-division situations to one standard situation, namely the situation where the divisor is an integer. If we do so we shall see that there exists a simple algorithm that will take care of all possible division cases.

In operating with decimal numbers you will see that the arithmetic of numbers in decimal form is in full agreement with the arithmetic of numbers

in fractional form.

You only have to use your knowledge of fractional numbers. Take addition, for example. Each step of addition in fractional form has a corresponding step in decimal form.

We only have to write the decimals so that all the decimal points lie on the same vertical line. This keeps each digit in its proper place-value position.

Since zero is the identity element of addition it is unnecessary to write .26 as .260, or 2.18 as 2.180 if you are careful to align the decimal points, as appropriate.

**а)** Переведите письменно 2, 5, 13, 14, 15 абзацы текста.

**б)** Ответьте письменно на следующие вопросы:

1 How many digits do we use in our numeration system?

2 What represents all digits to the left and to the right of the decimal point?

3 Why is division of numbers in decimal form more difficult to learn?

**с)** Поставьте все виды вопросов к следующему предложению:

Each step of addition in fractional form has a corresponding step in decimal form.



## Образец выполнения заданий контрольной работы 2

**Упражнение 1**

| | |
|---|---|
| Mathematical logicians have shown that for many interesting axiomatic theories the notion of theorem is not effective. | В математической логике установлено, что для многих интересных и важных аксиоматических теорий понятие теоремы не является эффективным |
| have shown | Present perfect Active от глагола to show |
| is | Present simple Active от глагола to be |

**Упражнение 2**

| | |
|---|---|
| What would you do if you didn't know the answer? | If I didn't know the answer I should ask the teacher. |

**Упражнение 3**

| | |
|---|---|
| Mathematical logicians have shown that for many interesting axiomatic theories the notion of theorem is not effective. | В математической логике установлено, что для многих интересных и важных аксиоматических теорий понятие теоремы не является эффективным. |

| | |
|---|---|
| have shown | Present perfect Active от глагола to show |
| is | Present simple Active от глагола to be |

**Упражнение 4**

| | |
|---|---|
| I can't solve this problem, let me try another one. | Я не могу решить эту задачу. Позвольте мне попробовать решить другую (задачу). |

# КОНТРОЛЬНАЯ РАБОТА 3

1 Все времена страдательного залога.
2 Модальные глаголы и их аналоги.
3 Местоимения some, any, no.
4 Инфинитив и его функции.

## ВАРИАНТ 1

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на страдательный залог.

1 Mathematics is loved be many, disliked by a few, admired and respected for all.
2 Physics is already mathematized to a high degree.
3 Definitions of "greater than" and "less than" have been made.
4 The ideas of any and of some were introduced into algebra be the use of letters, instead of the definite numbers in arithmetic.
5 An angle can be bisected but not trisected by elementary geometry.

**Упражнение 2**

Измените глаголы, стоящие в страдательном залоге на действительный залог и наоборот.

1 This fact was first provided by Gauss in his doctoral thesis in 1799.
2 How can all constructible problems be characterized?
3 Many students attended his lectures in functional analysis.
4 Pash formulated this statement as an axiom.

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на модальные глаголы и их эквиваленты.

1 An irrational number has a varying value and therefore cannot be written as the ratio of two integers.
2 Further we are to give up these assumptions.
3 The primes are the raw material out of which we have to build arithmetic.

4 This intrinsic theorem may have been proved centuries ago.

5 Once more we should emphasize that in some way our concept of geometrical constructions seems artificial.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на значения местоимений "some, any, no".

1 Some philosophers tried to present arguments in the form of theorems.

2 Into any set of axioms there must enter certain "undefined" concepts, such as "points" and "lines" in geometry.

3 No one could solve this equation.

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на функцию инфинитива.

1 The aim of physical research is to obtain physical laws.

2 Choice of method as a rule depends on the problem to be solved.

3 To prove Euclid's $5^{th}$ postulate became senseless after the discovery of non-Euclidean geometry.

4 We use various curvilinear coordinate systems to construct continuum mathematics.

5 We know the question to be settled.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## MATHEMATICAL PROOF

A proof is a demonstration that some statement is true. Maths involves proofs and it is even doubted by some people whether "proof in the precise and rigorous sense which the ancient Greek mathematicians gave to this word, is to be found outside maths. We may say that this sense did not change because what constituted a proof for Euclid is still a proof for us. It is to the Greeks that modern mathematicians turn again for models of proof.

The Greeks were the first to apply the deductive procedures developed by the Greek philosophers in maths. They are credited with the use of deductive methods of proof in geometry instead of intuition, experiment and trial-and-error methods of the Egyptians. Philosophers and mathematicians do not rea-

son and prove as do scientists on the basis of personally conducted experiments. Rather their reasoning centres about abstract concepts and broad generalization. Deduction as a method of obtaining conclusion has many advantages over reasoning by induction and analogy. Some historians claim that it was the discovery of the incommensurable line segments that forced the Pythagoreans to accept the axiomatic and synthetic approach in math proofs (i.e., an approach without using numbers) and led to the method of deriving theorems from axioms. The Greeks insisted that all math conclusions should be established by deductive reasoning only.

Math proof, thus, demands a specific kind of reasoning. In a formal math proof the mathematician cannot rely on his intuition, insight and imagination. He must reason logically and start with (1) the definitions of basic concepts for the theory involved. (2) axioms (or postulates) and (3) deduce a conclusion without making further assumptions. By analysis of the mechanism and structure of proofs we can see that the main feature of formal math proofs is that every statement in the proof must be justified by referring to (a) definition', (b) axioms (or postulate); (c) chain substitution', (d) the theorem already proved.

**а)** Переведите письменно 2-й абзац текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 A proof is a demonstration that some statement is true.

2 The Arabs were the first to apply the deductive procedures.

3 Reasoning by induction and analogy has many advantages over deduction as a method of obtaining conclusion.

4 Math proof demands a specific kind of reasoning.

## ВАРИАНТ 2

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на страдательный залог.

1 Many new and extensive fields of math investigation were opened up in the $17^{th}$ century.

2 We can compare the results that are being predicted theoretically with those observed experimentally.

3 The symbol $\sqrt{}$ was may have been used in the $16^{th}$ century.

4 Points are most commonly described today be ordered pairs (x, y) in the

Cartesian system.

5 The fundamental concepts of many branches of maths are the ones that have been suggested by physical experiences.

**Упражнение 2**

Измените глаголы, стоящие в страдательном залоге на действительный залог и наоборот.

1 The Galois' theory of equations is studied everywhere by advanced students.

2 The Egyptians freely used the distributive law.

3 Nearly all mathematicians have treated this subject.

4 Laws describing nature are being sought for.

5 The development of group theory was advanced by Cauchy.

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на модальные глаголы и их эквиваленты.

1 Do they have to reverse their approach to the problem? – No, they needn't.

2 They are allowed to take a compass to perform the construction.

3 Somebody can draw figures with such a high degree of accuracy.

4 She must make her own choice.

5 We are to find a good approximation to the number $\pi$ value.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на значения местоимений "some, any, no".

1 No mathematician confuses these basic terms.

2 We know something about his work.

3 In maths there exist some ways to study numbers.

4 Zero is neither "more real" nor "less real" than any other number.

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на функцию инфинитива.

1 To illustrate this, let us show how the notion of a distance can be gener-

alized from one and two dimensions to higher dimensions.

2 He made me prove the theorem.

3 We had a number of problems to solve.

4 It is important to work out all the details.

5 We are ready to do the work.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## BASIC GEOMETRIC CONCEPTS

The practical value of geometry lies in the fact that we can abstract and illustrate physical objects by drawings and models. For example, a drawing of a circle is not a circle, it suggests the idea of a circle. In our study of geometry we separate all geometric figures into two groups: plane figures whose points lie in one plane and space figures or solids. A point is a primary and starting concept in geometry. Line segments, rays, triangles and circles are definite sets of points. A simple closed curve with line segments as its boundaries is a polygon. The line segments are sides of the polygon and the end points of the segments are vertices of the polygon. A polygon with four sides is a quadrilateral. We can name some important quadrilaterals. Remember, that in each case we name a specific set of points. A trapezoid is a quadrilateral with one pair of parallel sides. A rectangle is a parallelogram with four right angles. A square is a rectangle with all sides of the same length. The regular polyhedra are a part of geometric study chiefly in antiquity. They have a symmetrical beauty that fascinates men of all ages. The first question in connection with regular polyhedra is: How many different types are there? Thanks to the ancient Greeks we know that there are exactly five types of polyhedra. All objects in their view are composed of four basic elements: earth, air, fire and water. They believe that the fundamental particles of fire have the shape of tetrahedron, the air particles have the shape of octahedron, of water – the icosahedron, and the earth – the cube. The fifth shape, the dodecahedron, they reserve for the shape of the universe itself. Plane geometry is the science of the fundamental properties of the sizes and shapes of objects and treats geometric properties of figures. The first question is, under what conditions two objects are equal or congruent in size and shape. Next, if figures are not equal, what significant relationship may they possess to each other and what geometric properties can they have in common? The basic relationship is shape. Figures of unequal size but of the same shape, that is, similar figures have many geometric properties in common It figures have neither shape nor size in common, they may have the same area, or, in geo-

metric terms, they may be equivalent, or may have endless other possible relationships. Geometry is the science of the properties, measurement and construction of lines, planes, surfaces and different geometric figures. What do we call "constructions" in our study of geometry? Ruler-compass constructions are simply the drawings which we can make when we use only a straightedge and a compass. A compass is a misleading word. It is not only "компас" in the maths, it is usually "циркуль". We call such misleading words "ложные друзья переводчика". For a ruler you ought to use an unmarked straightedge because measurement has no role in ruler-compass constructions. Of course, you can use a marked straightedge if you don't permit yourself to use these marks for measurement. Later you ought to do some measurement to "check" your constructions. We measure segments in terms of other segments and angles in terms of oilier angles. It seems only natural that we find areas indirectly as well. How does a person find the area of a floor? Does he take little squares one foot on a side, lay them out over the entire floor and thus decide that the area of a floor is 100 square feet, for this is indeed the meaning of area? Of course, he does not. He measures the length and width, quantities usually quite simple, and then multiplies the two numbers to obtain the area. This is indirect measurement, for we find the area when we measure lengths. The dimensions we take in the case of volume are the area and the length or the height. Greek mathematicians are the founders of indirect measurement methods. Their contribution to this subject are formulae (-las) for areas and volumes of particular geometric shapes, that we use nowadays. Thus, thanks to the Greeks we can find the area of any one single triangle when we take the product of its base and half its height. We also know due to them, that the "areas of two similar triangles are to each other as the squares of corresponding, sides". In other words even the very common formulae of geometry which we owe to the Greeks permit us to measure areas and volumes indirectly, when we express these quantities as lengths. We ought not to undervalue this contribution of the ancient Greek mathematicians. Their formulae for areas and volumes represent a great practical and important result. But this type of indirect measurement is not the only one of interest to the Greeks. They measure indirectly the radius of the Earth, the diameter of the Sun and Moon, the distances to the Moon, the Sun, some planets and stars.

**а)** Переведите письменно первые 10 предложений текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 The practical value of geometry lies in the fact that we can abstract and illustrate physical objects by counting them.

2 A point is a primary and starting concept in geometry.

3 Thanks to the ancient Arabs we know that there are exactly five types of polyhedra.

4 They measure indirectly the diameter of the Earth, the radius of the Sun and Moon, the distances to the Moon, the Sun, some planets and stars.

## ВАРИАНТ 3

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на страдательный залог.

1 They are being attracted to some centre of force around which their circular motion occurs.

2 All of Apollonius' work was presented in regular geometric form.

3 Algebraic formulas for finding the volumes of cylinders and spheres may have been used in Ancient Egypt to compute the amount of grain contained in them.

4 Actually, Descartes and Fermat were very much interested in optics.

5 Rhetorical algebra of any symbols and the words were used in their symbolic sense.

**Упражнение 2**

Измените глаголы, стоящие в страдательном залоге на действительный залог и наоборот.

1 The knowledge of nature was being codified in simple laws.

2 He employed the math method in his works on theoretical mechanics.

3These solutions were achieved by ingenious devices.

4 I shall have done my work by 5 o'clock tomorrow.

5 More than 200 algebraic structures have been studied lately by mathematicians.

**Упражнение 3**

Переведите следующие предложения на русский язык, обращая внимание на модальные глаголы и их эквиваленты.

1 In this lesson we are to get familiar with geometrical constructions.

2 With a straightedge we may draw a line determined by any two points.

3 He will be able to define all possible types of triangles.

4 You must seek the solution of the problem.

5 Do you have to define conic sections? – No, you needn't.

**Упражнение 4**

Переведите следующие предложения на русский язык, обращая внимание на значения местоимений "some, any, no".

1 No mathematician confuses these basic terms.

2 We know something about his work.

3 In maths there exist some ways to study numbers.

4 Modern mathematicians recognize zero as any number and not just a symbol for an empty space.

5 Nobody knows the name of the man who was first to say 1, 2, 3,…

**Упражнение 5**

Переведите следующие предложения на русский язык, обращая внимание на функцию инфинитива.

1 People can recognize the Greek letter numeral without difficulty.

2 To solve this problem you have to study the problem.

3 Archimedes' way to find the area of a circle is well-known.

4 Bhaskara is supposed to have made a careful formulation with the decimal system.

5 In many cases the truth of this law is likely to be evident.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## UNSOLVED PROBLEMS OF ANTIQUITY

Greek maths is significant for the questions it raised and did not answer. Among such questions are three famous construction problems known to every amateur in maths. They are referred to as "squaring the circle", "doubling the cube" and "trisecting the angle". To square the circle means to construct a square, the area of which is equal to the area of a given circle. To double a cube means to construct the side of a cube whose volume shall be double that of a given cube. To trisect an angle means to divide any angle into three equal parts. These constructions are to be performed only with an unmarked ruler and a compass. No other instruments are to be used.

The reason for this restriction sheds light on the classic attitude towards

maths. A ruler and a compass are the physical counterparts suggesting the concepts of a straight line and a circle. This restriction, self-imposed and arbitrary, was motivated by the desire to keep geometry simple and harmonious. The three construction problems were very popular in Greece. The first historical reference to them states that the philosopher Anaxagoras passed his time in prison trying to square the circle. Despite the repeated efforts of the best Greek mathematicians the problems were not solved. Nor were they to be solved for the next two thousand years. It was finally proved that the constructions cannot be performed under the conditions specified.

One of the "three famous problems of antiquity" was to find a geometrical construction for the edge of a cube having twice the volume of a given cube. It probably dates back to the time of the Pythagoreans (c. 540 B.C.). The Pythagorean theorem suggests a simple means for finding a square with twice the area of a given square – it is the "square" on the diagonal. If the side of the square is of unit length, we can thus solve the problem of finding a line segment of length $\sqrt{2}$. The corresponding problem of finding a segment of length $\sqrt[3]{2}$ was stated in a much more interesting form by the Grecks.

The Greek commentator of the period tells us of a letter supposedly written to Ptolemy I (not to be confused with the mathematician of the same name) concerning King Minos, who had a cubical tomb constructed for his son. The king was displeased with the size of the monument, however, and so ordered it doubled in size – by doubling the side. The commentator points out that this was an error as the tomb would thereby be increased fourfold in area and eightfold in volume; but he says, the geometers then tried to solve the problem.

**а)** Переведите письменно 2 абзац текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 There are three unsolved construction problems of antiquity: squaring the circle, doubling the cube and trisecting the angle.

2 These constructions are to be performed only with a compass. No other instruments are to be used.

3 The three construction problems were very popular in India.

4 One of the "three famous problems of antiquity" was to find a geometrical construction for the edge of a cube having twice the volume of a given cube.

## Образец выполнения заданий контрольной работы 3

**Упражнение 1**

| | |
|---|---|
| Despite the repeated efforts of the best Greek mathematicians the problems were not solved. | Несмотря на неоднократные попытки лучших греческих математиков задачи не были решены. |
| were not solved | Past simple Passive |

**Упражнение 2**

| | |
|---|---|
| Scientists introduce new concepts by rigorous definitions. | Ученые вводят новые понятия при помощи четких определений. |
| New concepts are introduced by rigorous definitions. | Новые понятия вводятся учеными при помощи четких определений. |
| Basic symbols of maths are applied by all the specialists. | Основные символы математики используются всеми специалистами. |
| All the specialists apply basic symbols of maths. | Все специалисты используют основные символы математики. |

**Упражнение 3**

| | |
|---|---|
| The teacher asked him to solve the problem. | Преподаватель попросил его решить эту задачу. |
| to solve | прямое дополнение. |

# КОНТРОЛЬНАЯ РАБОТА 4

Инфинитивные конструкции.
Оборот "for + Infinitive".
Причастие и причастные обороты.
Герундий.

## ВАРИАНТ 1

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на инфинитивные конструкции Complex Object и Complex Subject.

1 The difficulty in squaring the circle is believed to lie in the nature of the number π.
2 Two distinct points are expected to be symmetric.
3 The teacher wants me to write a report about Fermat.
4 The rules of arithmetic for complex numbers turn out to be the same as those for real numbers.
5 In ancient times some philosophers thought light to be a property of the eye.
6 They are unlikely to come in time.

**Упражнение 2**

Переведите на русский язык следующие предложения, обращая внимание на оборот "for + Infinitive".

1 It is often difficult for a mathematician to find an explicit solution of a given three-dimensional problem.
2 The above given equations are sufficient for us to determinate the three unknown stress resultants.
3 Two conditions must be met for the phenomenon to occur.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на функцию причастия.

1 A symbol is a mark or a sign word representing an object or an idea.

2 The mathematicians being invited to our University from aboard are well-known scientists.

3 The explanation of much of the physical phenomena involved presents some difficulty.

4 Unless otherwise specified, the condition is uniform.

5 Having picked out the products corresponding to these tables, we obtained a coordinate system for the space.

**Упражнение 4**

Подчеркните абсолютный причастный оборот в предложениях и переведите предложения на русский язык.

1 The square of any number being positive, the square root of a negative number is imaginary.

2 This set of axioms having been accepted, we could predict many new properties of the system involved.

3 Let us consider an arc on the sphere with a vertex at each end, the vertices being oppositely oriented.

**Упражнение 5**

Определите функцию герундия в предложениях. Переведите предложения на русский язык.

1 Asking him about this is useless.

2 Seeing is believing.

3 He stopped writing and looked at me.

4 This is the method for solving such problems.

5 The good results are due to his hard working.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## THE HISTORY OF GEOMETRY

The story of the history of geometry, like that of many other growing and changing subjecls, is composed of two intertwined strands. One strand narrates the growing content of the subject and the other the changing nature of the subject. The following is a brief outline of the birth and the development ofgeometry.

The economic and political changes of the last centuries of the second

millennium B.C. caused the power of Egypt and Babylonia to wane. New peoples came to the fore, and it happened that the further development of geometry passed over to the Greeks, who transformed the subject into something vastly different from the set of empirical conclusions worked out by their predecessors. The Greeks insisted that geometric fact must be established not by empirical procedures, but by deductive reasoning; geometrical truth was to be attained in the classroom rather than in laboratory. In short, the Greeks transformed the empirical or scientific geometry of the ancient Egyptians and Babylonians into what we may call "systematic" or "demonstrative" geometry. Greek geometry started in an essential way with the work of Thales of Miletus in the first halfof the sixth century B.C.

This versatile genius, one of the "seven wise men" of antiquity was a worthy founder of demonstrative geometry. He is the first known individual with whom the use of deductive methods in geometry is associated. He is credited with a number of very elementary geometrical results the value of which is not to be measured by their content but rather by the belief that he supplied them with a certain amount of logical reasoning instead of intuition and experiment. The next outstanding Greek geometer is Pythagoras who continued the systematization of geometry begun some fifty years earlier by Thales.

**а)** Переведите письменно 2-й абзац текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 The economic and political changes of the last centuries of the second millennium A.D. caused the power of Egypt and Babylonia to wane.

2 The Greeks insisted that geometric fact must be established not by empirical procedures, but by deductive reasoning.

3 Euclid is the first known individual with whom the use of deductive methods in geometry is associated.

4 He is credited with a number of very elementary geometrical results the value.



## ВАРИАНТ 2

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на инфинитивные конструкции Complex Object и Complex Subject.

1 The method is believed to be effective.
2 I want the problem to be solved.
3 They use this lemma to prove a theorem.
4 He wants the problem to be solved immediately.
5 This method proved to be the only possible one.
6 They happened to be in the lab.

**Упражнение 2**

Переведите на русский язык следующие предложения, обращая внимание на оборот "for+Infinitive".

1 It is advisable for them to go out.
2 The time taken for the equilibrium conditions to be set up is very small.
3 Here are the computations for them to use in the work.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на функцию причастия.

1 Considered from this point of view the question will be of great interest.
2 No number exists which has a negative value when multiplied by itself.
3 Having been measured with unreliable instruments, the e. m. f. was found inaccurate.
4 The properties of the curves involved are as yet not clearly understood.
5 Given the weight and the specific gravity of a body, you can calculate its volume.

**Упражнение 4**

Подчеркните абсолютный причастный оборот в предложениях и переведите предложения на русский язык.

1 The speed of light being extremely great, we cannot measure it by ordinary methods.
2 Other conditions being equal, the acceleration will be the same.
3 The value of X being given, the velocity of a body can easily be computed.

**Упражнение 5**

Определите функцию герундия в предложениях. Переведите пред-

ложения на русский язык.

1 His having discovered this law contributed much to world science.
2 Our aim is mastering this law.
3 There was no hope of our getting good results.
4 He is proud of having been appointed to this post.
5 We were very much surprised at their having refused to help us.

**Упражнение 6**
Прочитайте текст и выполните послетекстовые упражнения.

## DIFFERENTIAL GEOMETRY

Many new and extensive fields of math investigation were opened up in seventeenth century, making that era an outstandingly productive one in the development of maths. Unquestionably, the most remarkable math achievement of the period was the invention of the calculus by Isaac Newton and Gottfried Wilhelm van Leibnitz. A fair share of its remarkable applicability lies in the field of geometry and there is an exceedingly vast body of geometry wherein one studies properties of curves and surfaces, and their generalizations, by means of the calculus. This body of geometry is known as "differential geometry". For the most part, differential geometry investigates curves and surfaces only in the immediate neighbourhood of any one of their points. This aspect of differential geometry is known as "local differential geometry" or "differential geometry in the small". However, sometimes properties of the total structure of a geometric figure are implied by certain local properties of the figure that hold at every point of the figure. This leads to what is known as "integral geometry" or "global differential geometry", or "differential geometry in the large". It is probably quite correct to say that differential geometry, at least in its modern dress, started in the early part of the eighteenth century with the interapplications of the calculus and analytic geometry. Karl Friedrich Gauss (1777-1855) introduced the fruitful method of studying the differential geometry of curves and surfaces by means of parametric representation of these objects. Bernhard Riemann introduced an improved notation and a procedure independent of any particular coordinate system employed. The tensor calculus was accordingly devised and developed. Here we find an assertion of the tendency of maths in recent times to strive for the greatest possible generalization.

Generalised differential geometries, known as Riemannian geometries were explored intensively, and this in turn led to non-Riemannian, and other

geometrics. Much of this material finds significant application in relativity theory and other parts of modern physics.

**а)** Переведите письменно первые 10 предложений текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 The most remarkable math achievement of the period was the invention of the calculus by Isaac Newton and Gottfried Wilhelm van Leibnitz.

2 For the most part, differential geometry investigates curves and surfaces not only in the immediate neighbourhood of any one of their points.

3 Generalised differential geometries, known as Riemannian geometries were explored extensively.

4 Much of this material finds significant application in relativity theory and other parts of modern physics.

## ВАРИАНТ 3

**Упражнение 1**

Переведите следующие предложения на русский язык, обращая внимание на инфинитивные конструкции Complex Object и Complex Subject.

1 We know the question to be settled.

2 They use various curvilinear coordinate systems to construct continuum mechanics.

3 I tried to make him understand my point, but failed.

4 The student is known to work very hard.

5 This method is unlikely to yield good results

6 This law is certain to hold in all cases.

**Упражнение 2**

Переведите на русский язык следующие предложения, обращая внимание на оборот "for + Infinitive".

1 We waited for our friend to finish his computation.

2 It was for him to decide.

3 It is impossible for a single force to produce the same effect as a couple.

**Упражнение 3**

Переведите предложения на русский язык, обращая внимание на функцию причастия.

1 There are exactly two points lying over each point of the Z-sphere.

2 The method followed by the lecturer was not accurate.

3Having been invented simultaneously, though independently, by Newton and Leibnitz, the calculus gave rise to bitter enmity between the two scientists.

4 The answer, of course, depends on the type of unit concerned.

5 Repeating and combining these processes, we arrive at the general case.

**Упражнение 4**

Подчеркните абсолютный причастный оборот в предложениях и переведите предложения на русский язык.

1 There exists, of course, various kinds of light, each corresponding to some definite colour.

2 It being Sunday, the computer hall was closed.

3 The student may have encountered one-one correspondence in Geometry, it being a special case of many-one correspondence.

**Упражнение 5**

Определите функцию герундия в предложениях. Переведите предложения на русский язык.

1 They insisted on the question being reconsidered.

2 The matter is worth speaking of.

3 Can you remember having mentioned the fact to anyone before?

4 Avoid making such bad mistakes.

5 Her aim is passing our exams well.

**Упражнение 6**

Прочитайте текст и выполните послетекстовые упражнения.

## NON-EUCLIDEAN GEOMETRY

There is evidence that a logical development of the theory of parallels gave the early Greeks a lot of trouble. Euclid met the difficulties by defining parallel lines as coplanar straight lines that do not meet one another however

far they may be produced in either direction, and by adopting as an initial assumption his now famous parallel postulate: "If a straight line intersects two straight lines so as to make the interior angles on one side of it together less than two right angles, the two straight lines will intersect, if indefinitely produced, on the side on which are the angles which are together less than two right angles". Actually, the postulate is the converse of Proposition 17 of Euclid's Book II and it seemed more like a proposition than a postulate. It was natural to ask if the postulate was really needed at all, or perhaps it could be derived as a theorem, or, at least, it could be replaced by a more acceptable equivalent. The attempts to devise substitutes and to derive it as a theorem from the rest of Euclid's postulates occupied geometers for over two thousand years and culminated in the most far-reaching development of modern maths – non-Euclidean geometry.

Topology started as a branch of geometry, but during the second quarter of the twentieth century it underwent such generalization and became involved with so many other branches of maths that it is now more properly considered, along with geometry, algebra, and analysis, a fundamental division of maths. Today topology may roughly be defined as the math study of continuity, though it still reflects its geometric origin. Topology is the study of those properties of geometric figures which remain invariant under so-called topological transformations, that is, under single-valued continuous mapping possessing single-valued continuous inverses.

**а)** Переведите письменно первые 10 предложений текста.

**б)** Согласитесь со следующими утверждениями или опровергните их:

1 Euclid didn't meet the difficulties by defining parallel lines as coplanar straight lines that do not meet one another however far they may be produced in either direction.

2 Actually, the postulate is the converse of Proposition 17 of Euclid's Book II and it seemed more like a postulate than a proposition.

3 Topology started as a branch of geometry.

4 Topology is the study of those properties of geometric figures which remain invariant under so-called topological transformations.

### Образец выполнения заданий контрольной работы 4

**Упражнение 1**

| | |
|---|---|
| For two thousand years the scientists considered the basic laws of | В течение двух тысяч лет ученые полагали, что основные законы |

| | |
|---|---|
| geometry offered by Euclid to be indisputable. | геометрии, предложенные Евклидом, являются неоспоримыми. |
| He is certain to have found a solution of the problem. | Несомненно, он нашел решение задачи. |

**Упражнение 2**

| | |
|---|---|
| Considered from this point of view the question will be of great interest. | Рассмотренный с этой точки зрения вопрос, будет представлять большой интерес. |
| Considered | Обстоятельство |

**Упражнение 3**

| | |
|---|---|
| This is the method for solving such problems. | Это метод решения таких задач. |
| solving | Определение |

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**Петухова Галина Николаевна**

# АНГЛИЙСКИЙ ЯЗЫК

## ЗАДАНИЯ К КОНТРОЛЬНЫМ РАБОТАМ

***для студентов заочного факультета специальности 1-31 03 01 02 «Математика (научно-педагогическая деятельность)»***

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