科技英语入门

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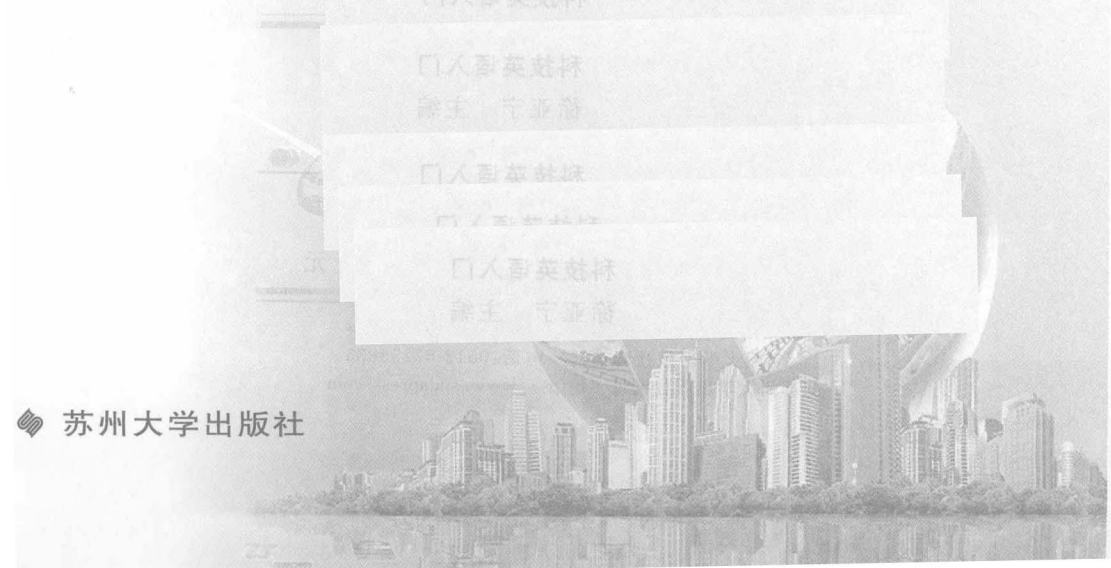

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编写说明

1. 教材说明

本教材共分10单元，内容包含数学、物理学、生物学、化学、通信、电子、计算机及机械等理工科题材。

第一单元为数学和物理学。主要介绍了一些基本的、常见的数学和物理学方面的英语词汇，同时介绍了数学和物理学的兴起、发展及其分支。

第二单元介绍了计算机软件知识。作为工科学生，对计算机软件方面的基本英语词语有所掌握还是必需的。同时本单元还详细介绍了如何用计算机来处理实际问题，也就是软件的设计过程。第三单元介绍了计算机网络知识。随着信息时代的发展，信息交流量也与日俱增，因此我们选择介绍了部分网络知识。

第四单元和第五单元则是对电子电路知识的介绍，包括了模拟电路知识和数字电路知识。这两个单元中，从基本的电子元器件入手，直到整体电路的介绍，由浅入深，对整个电子电路方面作了系统的介绍。

第六单元和第七单元是对通信基本知识的介绍。第六单元介绍了目前通信领域使用非常广泛的软件MATLAB，第七单元则详细阐述了通信调制。这两个单元中有大量的、基本的通信专业英文术语，同时也结合生产实际对滤波器的设计作了详细的介绍。

第八单元、第九单元及第十单元分别介绍了机械、化工和生物学科的一些基本概念，以及这些领域的研究范畴。

2. 教材特色

目前市场上流传着多种版本的科技英语教材。如何使我们所编写的科技英语教材与市场上已有的教材有所特色，是我们编写过程中重点考虑的

问题。

本教材最大的特色就是在口语方面做了较多尝试，我们在每章都配备了针对本单元主题和文章内容的口语题目，供老师在上课时选择性进行师生、生生等口语交流练习。

本教材取材广泛，覆盖了理工科绝大部分基础知识。

本教材各单元选排合理，严谨，科学。每一单元包括4篇课文，其中，Passage A和Passage B是精读课文，之后为Notes, Key words and phrases, Exercises和Extended reading。Extended reading中包含两篇泛读课文，即Passage C和Passage D，要求学生在课后能独立阅读。在这两篇课文后，也给出了部分生词的注解。

本教材注重实用性、先进性。例如在每单元后，都编写了Application writing，来引导学生用英语完成对一些应用问题的写作；通信单元介绍的MATLAB所设计的滤波器的方法在通信领域就是比较领先的。

本教材强调学生思考为主，老师讲解为辅。在每单元前，都有本单元的目标，让学生根据这些目标带着问题去预习、去思考，这样有利于进一步开发学生独立学习的能力。

大量练习题目也是本教材的一个特色。英语的学习是比较枯燥的，学生所做的练习往往都是阅读理解、词汇填空。我们一改平常，引入了大量的新题型，其中判断改错就是一种新题型，它要求的并不是修改语法方面的错误，而是修改有关专业知识的错误，这样让学生涉猎一些科技方面的知识，从而激发学生专业英语学习的兴趣。

此次尝试科技英语教材的编写是我们对平时教学的一次深入思考，其中不当之处敬请同行及读者多加指正！

编　者

2009年2月

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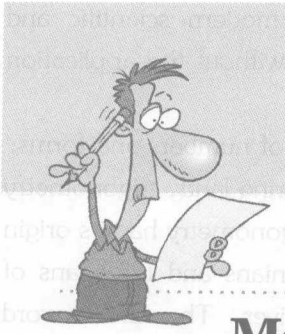


Unit One

Mathematics and Physics

Goals

After studying the unit, you should be able to

- describe the branches of mathematics.
- explain the differences between mathematics' axiom and mathematics' definition.
- describe the branches of physics.
- describe the first, second and third laws of motion.
- explain the differences between dynamics and statics.

Texts

Passage A

Mathematics

Mathematics comes from man's social practice, for example, industrial and agricultural production, commercial activities, military operations and scientific and technological researches. And in turn, mathematics serves the

practice and plays a great role in all fields. No modern scientific and technological branches could be regularly developed without the application of mathematics.

From the early need of man came the concepts of numbers and forms. Then, geometry developed out of problems of measuring land, trigonometry came from problems of surveying. Geometry and trigonometry had its origin long ago in the measure and survey by the Babylonians and Egyptians of their lands inundated by the floods of the Nile River. The Greek word "geometry" is derived from "geo", meaning "earth", and "metry", meaning "measure". As early as 2000 BC, we find the land surveyors of these people re-establishing vanishing landmarks and boundaries by utilizing the truths of geometry.[1] Geometry and trigonometry are a science that deals with forms made by lines. A study of geometry and trigonometry is an essential part of the training of the successful engineer, scientist, architect, and draftsman.[2] The carpenter, machinist, stonecutter, artist, and designer all apply the facts of geometry and trigonometry in their trades. Later, to deal with some more complex practical problems, man established and then solved equation with unknown numbers, thus algebra occurred. Before the 17th century, man confined himself to the elementary mathematics, i.e. geometry, trigonometry and algebra, in which only the constants were considered.

The rapid development of industry in the 17th century promoted the progress of economics and technology and required dealing with variable quantities. The leap from constants to variable quantities brought about two new branches of mathematics—analytic geometry and calculus, which belong to the higher mathematics. Now there are many branches in higher mathematics, among which are mathematical analysis, higher algebra, differential equations, function theory and so on. The study of differential equations is one part of mathematics that, perhaps more than any other, has been directly inspired by mechanics, astronomy, and mathematical physics. Its history began in the 17th century when Newton, Leibniz and

Bernoulli solved some simple differential equations arising from problems in geometry and mechanics.[3] These early discoveries, beginning about in 1690, gradually led to the development of a lot of "special tricks" for solving certain special kinds of differential equations. Although these special tricks are applicable in relatively few cases, they do enable us to solve many differential equations that arise in mechanics and geometry, so their study is of practical importance.

Mathematicians study conceptions and propositions. Axioms, postulates, definitions and theorems are all propositions. Notations are a special and powerful tool of mathematics and are used to express conceptions and propositions very often. Formulas, figures and charts are full of different symbols. Some of the best known symbols of mathematics are the Arabic numerals 1, 2, 3, 4, ..., and the signs of addition "+", subtraction "−", less "<", sigma "Σ" and inequality "$\neq$" and so on.

The conclusions in mathematics are obtained mainly by logical deductions and computation. For a long period of the history of mathematics, the centric place of mathematical methods was occupied by the logical deductions.[4] Now, since electronic computers are developed promptly and used widely, the role of computation becomes more and more important, in our times, computation is not only used to deal with a lot of information and data, but also to carry out some work that merely could be done earlier by logical deductions, for example, the proof of most of geometrical theorems.[5]

Passage B

Physics

Physics is the study of the properties of matter and energy. Physicists try to understand the universe by searching for the basic laws of nature. They do this by performing experiments. Then they propose a law that explains the results of these experiments. The proposed law can be used to

predict other effects. These effects must also be tested by experiment. If they fit the proposed law, then the law becomes established. Most laws have been shown to be at least slightly inaccurate. A new law is then proposed to explain the new results, for example, Sir Newton's theory of mechanics [6] was accepted for more than 200 years, until the beginning of the 20th century, however, experiments on objects moving at almost the speed of light could not be explained by Newton's theory. A new theory, the theory of relativity, was devised by Albert Einstein to explain these new results.

Most physical laws are stated mathematically. Mathematics is a very important and powerful tool for a physicist. Many experiments in physics involve measurements. The measurements give number that can be treated mathematically.

Nowadays it is difficult to divide physics into separate branches. This is because more and more overlapping areas of the different branches are being discovered. However, for convenience, physics is still divided into mechanics, heat, light, sound, electricity and magnetism, and solid state physics. There are also branches that cover atomic, nuclear, and particle physics. [7]

Mechanics is the study of material bodies and the forces that act on them. It is divided into two main branches: statics and dynamics. Statics is the study of forces acting on a body at rest, such as forces acting on a bridge. Dynamics is the study of forces that cause bodies to move, such as the forces acting on a swinging pendulum.

Heat studies are concerned with the effect of temperature on various substances. Heat is a form of energy. It can be changed into different forms of energy such as mechanical or electrical energy. Thermodynamics is the branch of "heat physics" that is the study of the transformation of energy.

The study of light is called optics. It investigates the nature and properties of light. An important part of optics is the study of optical instruments such as telescopes and microscopes.

Sound is studied in a branch of physics called acoustics . Acoustics is the

study of properties of sound such as the ways in which sound is transmitted through air and other materials, and how sound is produced. An important part of acoustics is the design of acoustical buildings such as concert halls, and acoustical equipment.

Electricity and magnetism were once considered to be two separate subjects. During the 1800s, however, several connections were discovered between them. Electricity and magnetism are now studied as a single subject. The study of the connections between electricity and magnetism is called **electromagnetism**.

Solid state physics is a recent branch of physics. It explains the properties of a solid in terms of its atoms. One of the results of solid state physics has been the invention of the transistor. Transistors are now used in many different electronic devices.

Atomic, nuclear, and particle physics are also recent branches of physics. Atomic and nuclear physics include the study of the atom and the nucleus. Particle physics is the study of the particles that make up the nucleus and other subatomic particles. The mathematics needed for these subjects is very advanced. Many of the properties of atoms, nuclei, and particles are explained by **quantum theory**.

Notes

[1] ... we find the land surveyors of these people re-establishing vanishing landmarks and boundaries by utilizing the truths of geometry.

注释[1]中 find 意思是“发现”，后接宾语 the land surveyors of these people，re-establishing 引起的分词短语作宾语补足语，即 find sb. doing sth. 结构。

这句话可翻译成：我们发现这些民族的土地测量者利用几何知识重新确定消失了的土地标志和边界。

[2] A study of geometry and trigonometry is an essential part of the

training of the successful engineer, scientist, architect, and draftsman.

注释[2]及注释[2]后一句话列举出了许多不同行业，用于旁证几何学和三角学在生活中的重要性。

[3] Its history began in the 17th century when Newton, Leibniz and Bernoulli solved some simple differential equations arising from problems in geometry and mechanics.

注释[3]揭示了微分方程的起源，提到几位伟大的数学家，其中牛顿(Sir Isaac Newton，1642—1727)是英国物理学家、天文学家、数学家和哲学家，生于林肯郡。莱布尼茨(Gottfried Wilhelm von Leibniz，1646—1716)是德国自然科学家、数学家和哲学家。伯努利(Jakob Bernoulli，即 Jacques Bernoulli，1654—1705)，瑞士数学家，变分法创始人之一，曾和莱布尼茨共同获得微积分学中的不少结果，对常微分方程的积分法有贡献，也是概率论的早期研究者，提出了关于大数法则的伯努利定理及伯努利数。关于微积分创立的优先权，在数学史上曾掀起了一场激烈的争论。实际上，牛顿在微积分方面的研究虽早于莱布尼茨，但莱布尼茨成果的发表则早于牛顿。目前科学界普遍认为莱布尼茨和牛顿共同将积分和微分真正沟通起来，明确地找到了两者内在的直接联系：微分和积分是互逆的两种运算，而这正是微积分建立的关键所在。因此，微积分是牛顿和莱布尼茨大体上完成的。

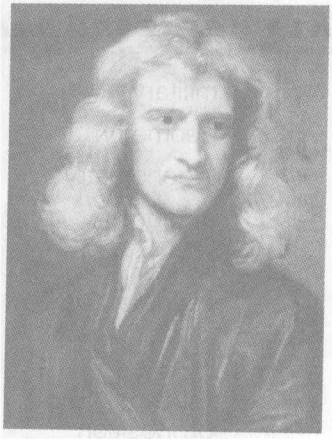
[4] For a long period of the history of mathematics, the centric place of mathematical methods was occupied by the logical deductions.

注释[4]翻译成主动式较为符合中文的习惯：在数学史很长的时期内，逻辑推理一直占据数学方法的中心地位。

[5] ... in our times, computation is not only used to deal with a lot of information and data, but also to carry out some work that merely could be done earlier by logical deductions, for example, the proof of most of geometrical theorems.

注释[5]可以译为：现在，计算不仅用来处理信息与数据，而且用来完成一些在以前只能靠逻辑推理来做的工作，例如证明几何定理。

[6] ... Sir Newton's theory of mechanics　牛顿力学体系



Sir Isaac Newton: was an English physicist, mathematician, astronomer, natural philosopher, alchemist and theologian. His *Philosophiae Naturalis Principia Mathematica* published in 1687, is considered to be the most influential book in the history of science. In this work, Newton described universal gravitation and the three laws of motion, laying the groundwork for classical mechanics, which dominated the scientific view of the physical universe for the next three centuries and is the basis for modern engineering. Newton showed that the motions of objects on Earth and of celestial bodies are governed by the same set of natural laws by demonstrating the consistency between Kepler's laws of planetary motion and his theory of gravitation, thus removing the last doubts about heliocentricism and advancing the scientific revolution.

[7] However, for convenience, physics is still divided into mechanics, heat, light, sound, electricity and magnetism, and solid state physics. There are also branches that cover atomic, nuclear, and particle physics.

注释[7]基本概括了目前物理学的各个分支，可译成：然而，物理学仍旧可以分为力学、热学、光学、声学、电学和磁学，以及固态物理学。还有一些分支包括了原子物理学、核物理学和粒子物理学。

Key words and phrases

military	军事的,军用的
geometry	几何学
trigonometry	三角学
algebra	代数学
constant	常量
variable quantity	变量
calculus	微积分学
differential	微分的
proposition	命题
axiom	公理
postulate	假设,假定
theorem	定理
notation	符号
deduction	推论,演绎
computation	计算,估算
theory of mechanics	力学论
overlap	重叠,交叠
solid state physics	固态物理学
atomic	原子的
nuclear	核的,(原子)核的,核子的
particle	粒子,质点
thermodynamics	热力学
optics	光学
acoustics	声学
electromagnetism	电磁学
quantum theory	量子理论

Exercises

1. Oral practice.

(1) Why do we study mathematics and physics?
(2) What are the branches of mathematics?
(3) What branches of study is physics divided into?
(4) What do the three motion laws mention about?
* (5) What causes body acceleration?

2. Fill in the blanks according to the above passages.

(1) Mathematics comes from man's social practice, for example, industrial and _____ production, commercial activities, military operations and scientific and _____ researches.
(2) Physics is the study of the properties of _____ and _____.
(3) _____ are a special and powerful tool of mathematics and are used to express conceptions and _____ very often.
(4) The conclusions in mathematics are obtained mainly by logical _____ and _____.
(5) Mechanics is the study of material bodies and the _____ that act on them.
(6) The rapid development of industry in the 17th century promoted the progress of _____ and technology and required dealing with variable _____.
(7) The study of the connections between electricity and magnetism is called _____.
(8) Acoustics is the study of properties of _____ such as the ways in which sound is _____ through air and other materials, and how sound is _____.

(9) An important part of _____ is the study of optical instruments such as telescopes and microscopes.

(10) Atomic and nuclear physics include the study of the _____ and the _____. Particle physics is the study of the _____ that make up the nucleus and other subatomic particles.

3. Judge whether the following statements are true or false, and correct the mistakes in the false statements.

(1) Physics studies all the properties of solid materials. ( )

Modification:

(2) Mechanics is divided into three main branches: statics mechanics, dynamics mechanics and electricity-magnetism mechanics. ( )

Modification:

(3) Heat can be changed into different forms of energy such as mechanical or electrical energy. ( )

Modification:

(4) The speed of sound in free space is 3×10^8 m/s. ( )

Modification:

(5) Electromagnetism studies the connections between electricity and magnetism. ( )

Modification:

(6) To deal with known numbers and some more complex practical problems, man established and then solved equation with algebra. ( )

Modification:

4. Translate the following technological phrases into English or Chinese.

(1) 数学 (2) 高等代数

(3) 微分方程　　(4) 解析几何
(5) 逻辑推理　　(6) 几何定理
(7) physical laws　　(8) the established law
(9) the law of conservation of energy
(10) Newton's theory of mechanics

5. Make sentences using the following phrases.

(1) play a role in
(2) belong to
(3) deal with
(4) carry out

*6. Read the following essay and answer the questions.

In mathematics, the Pythagorean theorem (American English) or Pythagoras' theorem (British English) is a relation in Euclidean geometry among the three sides of a right triangle. The theorem is named after the Greek mathematician Pythagoras, who by tradition is credited with its discovery and proof although knowledge of the theorem almost certainly predates him. The theorem is as follows:

In any right triangle, the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle) as the below figure shown.