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（上 册）

高级科技英语

ADVANCED SCIENTIFIC ENGLISH

● 航天科技情报研究所 编著

● 北京出版社

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(京)新登字200号

高级科技英语(上下册)
GAOJI KEJI YINGYU
*
北京出版社出版
(北京北三环中路6号)
邮政编码:100011
北京出版社总发行
新华书店北京发行所经销
北京第二新华印刷厂印刷
*
787×1092毫米 16开本 37.25印张
1992年4月第1版 1992年4月第1次印刷
印数 1—3000
ISBN 7—200—01610—1/H·81
定价: 18.20元

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高级科技英语

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前　言

《高级科技英语》是国防科工委情报局委托航空航天部航天科技情报研究所为国防科工委系统和各国防工业部门科技情报人员提高英语水平而编写的继续工程教育教材。目的是使具有一定英语基础的理工科毕业的科技人员进一步提高英语水平，提高阅读英语科技文献的能力。学完本书后能比较正确地阅读和理解难度较大的文章。阅读速度可达到每分钟80—100字符，辨认词汇量扩大到6000—7000之间。学会写英文提要的方法，具有写英文提要的能力。

为编好本书，编写组织者对目前国内的科技英语教材、科技人员英语水平和继续工程教育英语教学情况进行了大量艰苦的调研。在广泛征求专家和科技人员意见的基础上，拟定了编写大纲、编写要求，收集、确定了课文选材范围和资料，使得本书能尽量集各类文体科技英语之精华，满足具有中等以上英语水平人员提高科技英语阅读能力的需要。

着眼于当代科学技术的发展，本书课文题材广泛、内容丰富，不仅能提高科技英语水平，而且可以学习科技新知识，课文有一定难度和深度。全书共24单元，有72篇课文。为使学习由浅入深、循序渐近，在课文编排上第1—8单元课文选编的是基础性科普文章，第9—16单元选编的是专业性科普文章，第17—24单元课文选编的是概论性或述评性文章。所选课文都以扩大词汇量、掌握句法为原则。每篇课文的关键词、词组和应特别注意的语言现象都做了注释。为促进读者养成用英文思考的习惯和提高查阅英文原文词典的能力，除专业性强的词、专用词以汉语注释外，均以英文注释。练习分理解、词汇、构词、封闭式填空、英译汉等五部分，并附有答案。练习设计以提高阅读能力和技巧为重点，理解练习以帮助读者写提要为原则。

为提高学习效果，我们已将本教材拍成《高级科技英语录像教学片》，共120学时。录像教学由清华大学外语系教师担任。录像教学片丰富了本教材的内容，特别在培养英文提要撰写能力方面突出进行了讲授。录像带正由北京高教音像出版社发行。

本书亦可作为高等院校高年级学生、研究生的学习教材。

本书由下列人员编著：第1—8单元陈允智、第9—16单元俞德圣、第17—24单元王克礼、总词表谷志刚。全书由谷志刚、邢文美组织编纂，盛智龙直接领导了本书的编写工作，裴晓亮提供了航天领域方面的选材资料。

清华大学李相崇、肖立齐、周晏如、毕兆年对本书进行了审定。

在本书组织编写及大纲拟定过程中，宫宏光同志和于振中、李佩教授给予了热情的、精心的指导，张培基、牛成儒教授对本书编写大纲给予了很大帮助。航天情报所的许多同志对本书的编写给予了具体的帮助和指导，在此致以诚挚的谢意。

由于时间仓促，编者水平有限，本书的缺点和不妥之处在所难免，恳请读者批评指正。

编　者

一九九一年十一月

CONTENTS

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LESSON ONE

The Fields and Uses of Physics

1 This is a scientific age. Our material prosperity, the conveniences of life, and often life itself rest upon the development of our science. Although the practical fruits of science are not to be despised, its true significance is more subtle. The study of science has profoundly influenced the way men think.[1] Science has created gadgets, but it has also given man confidence in his intellectual supremacy over nature and has provided the method of approach to all problems requiring a conclusion from observed facts. The science of physics, which provides the tools for the chemist, geologist, engineer, and astronomer, has also originated the scientific method.

2 A science is a body of organized knowledge. The steps in the origin and development of a science are observation, recording, analysis, prediction, and verification. Accurate observation under controlled conditions is the first step in understanding nature. Records provide for the transmission of knowledge and aid its continued growth. Analysis proceeds from conjecture of the causes or relationships of certain observations, and, when the hypotheses have been tested, erects a theory that relates a large number of phenomena. The theory usually predicts certain as yet unsuspected phenomena or relationships. Verification of these predictions by experiment supports the theory and may lead to formulation of a law or principle. Failure to obtain experimental verification of predictions may not overthrow a theory, but causes its modification and often enriches it. The principal aspects of the scientific method are selective analysis, accurate measurement, and mathematical treatment. These techniques originated and received their fullest development in the field of physics. Other fields of knowledge, by common consent, are considered scientific to just the extent that their ideas are subject to analysis, measurement, and mathematical treatment.

3 To understand one's environment today and to be able to adapt oneself to it demand some appreciation of the scientific attitude. As consumers of the products of a scientific age, we want to understand the foundations of our industrial science, to keep informed of current discoveries, to be able profitably to use new developments, to recognize reliable information and true scientific progress, and to avoid quackery.

4 An understanding of the essential character of scientific investigation is best acquired from the study of a representative particular science. It seems desirable to choose the science which is most responsible for the attitude and viewpoint of the scientific age and which is today influencing scientific thought most profoundly, namely, physics.

5 Occasional discoveries of important phenomena were made by primitive man. The Babylonians and Egyptians possessed surprisingly refined methods of measuring time, distance, and

weight. But these observations and inventions did not lead to statements of general principles. The observations were largely isolated and unrelated. Science, in contrast, is systematic and cumulative. Much of our science has its roots in Greek thought. But the Greeks were preoccupied with the question of why things moved and behaved in a certain manner and their answers were based on speculation, not experimentation. The modern approach to nature is to ask the more modest question, how things move, and to seek the answer in experiment. Not until the sixteenth century did man adopt the scientific method of studying his environment. Great progress was made then and in the succeeding centuries technological development has become increasingly rapid.

6 The rise of all the natural sciences has been almost simultaneous. Until as recently as about a hundred and fifty years ago the content of all the physical sciences including physics, astronomy, chemistry, and engineering, resided in a study called natural philosophy. This entire body of knowledge was so small that it was possible for a capable man to be an authority in all these fields and to contribute to the progress in each.

7 In the nineteenth century an avalanche in the development of natural philosophy led to specialization. James Watt's invention, which made the steam engine practical (1769), gave importance to the field of applied physics or engineering. This field received further impetus with the applications of the electrical discoveries of Faraday[2] and Ampère[3] and the invention of the internal combustion engine. With the atomic theory of matter placed[4] on an experimental basis by John Dalton[5] (1808), chemistry developed as a separate science. Astronomy, using the tools and ideas of physics, became a specialized field.

8 Physics is often defined as the science of matter and energy. Physics is concerned chiefly with the laws and properties of the material universe. These are studied in the closely related sciences of mechanics, heat, sound, electricity, light, and atomic and nuclear structure. The principles studied in these fields have been applied in numerous combinations to build our mechanical age. Such recent terms as chemical physics and biophysics are indicative of the widening application of the principles of physics, even in the study of living organisms.

9 A fascinating portion of physics is known as modern physics. This includes electronics, atomic and nuclear phenomena, photoelectricity, X rays, radioactivity, the transmutations of matter and energy, relativity, and the phenomena associated with electron tubes and the electric waves of modern radio. The breaking up of atoms now provides a practical source of energy. Many of the devices that are commonplace today are applications of one or more of these branches of modern physics. Radio, long-distance telephony, sound amplification, and television are a few of the many developments made possible by the use of electron tubes. Photoelectricity makes possible television, transmission of pictures by wire or radio, sound motion pictures, and many devices for the control of machinery. Examination of welds and castings by X rays to locate hidden flaws is standard procedure in many industries. The practical application of the developments of physics continues at an ever increasing rate.

10 Practical applications of physics are not all made by those labeled as physicists, for the ma-

jority of those who apply the principles of physics are called engineers. In fact most of the branches of engineering are closely allied with one or more sections of physics: civil engineering applies the principles of mechanics; mechanical engineering utilizes the laws of mechanics and heat; electrical engineering is based on the fundamentals of electricity; acoustical engineering and optical engineering are the industrial applications of the physics of sound and light. The alliance between engineering and physics is so close that a thorough knowledge and understanding of physical principles is essential for progress in engineering.

11 One of the tools common to physics and engineering is mathematics. Principles are expressed quantitatively, concisely, and most usefully in the language of mathematics. In development and application, careful measurement is essential. If we are to make effective use of the principles and measurements of physical science, we must have a workable knowledge of mathematics. Physics and mathematics are thus basic to all science and engineering.

GLOSSARY

1.	prosperity	n.	(the state of having) good fortune and success
2.	despise	v.	to regard as worthless, low, bad, etc.
3.	subtle	adj.	delicate, hardly noticeable
4.	profoundly	adv.	deeply
5.	gadget	n.	a small machine or useful apparatus
6.	intellectual	adj.	showing intelligence
7.	supremacy	n.	highest authority or position
8.	astronomer	n.	a person who studies the stars scientifically
9.	originate	v.	to (cause to)begin
10.	prediction	n.	something that is predicted
11.	verification	n.	testing or confirming the truth or accuracy of something
12.	transmit	v.	to send or pass from one person, place or thing to another
13.	transmission	n.	the act of transmitting or being transmitted
14.	conjecture	n.	the formation of an idea, opinion, etc., from incomplete or uncertain information
15.	hypothesis	n.	an idea which is thought suitable to explain the facts about something
16.	unsuspected	adj.	not known or thought of
17.	formulate	v.	to express in a short clear form
18.	formulation	n.	the act of formulating
19.	modification	n.	modifying or being modified
20.	selective	adj.	having the power to select
21.	consent	n.	agreement; permission
22.	appreciation	n.	understanding of the qualities or worth of something

23.	consumer	n.	a person who buys and uses goods and services
24.	profitably	adv.	useful; resulting in advantage
25.	quackery	n.	methods or practices used by persons who dishonestly claim to have knowledge and skill
26.	Babylonian	n.	巴比伦人
27.	Egyptian	n.	埃及人
28.	cumulative	adj.	increasing steadily in amount by one addition after another
29.	preoccupy	v.	to take all the attention or hold interest of someone almost completely
30.	speculation	n.	reasoning lightly or without all the facts
31.	simultaneous	adj.	happening or done at the same moment
32.	reside	v.	to live
33.	avalanche	n.	a large quantity that has arrived suddenly
34.	specialization	n.	specializing or being specialized
35.	impetus	n.	impulse; driving force
36.	combustion	n.	process of burning
37.	indicative	adj.	giving indication
38.	fascinating	adj.	having strong charm or attraction
39.	transmutation	n.	change in the shape, nature or substance of something
40.	commonplace	adj.	common; ordinary
41.	telephony	n.	art, science, process, of sending and receiving the sound of the human voice by telephone
42.	amplification	n.	increase in the strength of something
43.	flaw	n.	a crack; slight defect
44.	label	v.	to put into a kind or class; describe as
45.	ally	v.	to join or unite
46.	acoustical	adj.	of or concerning sound or the sense of hearing
47.	concisely	adv.	briefly and clearly
48.	workable	adj.	which will work out; usable

NOTES

1. the way men think = the way in which men think = the way (that) men think
   In relative clauses after "way" (meaning "manner, method") we often use "that" instead of "in which"; and "that" is often left out.
   e.g. I like the way she organized the meeting.
   I should like to know the way you learned to master the fundamental technique within so short a time.

2. Faraday, Michael (1791-1867), English physical scientist. He discovered electromagnetic induction and many other important electrical and magnetic phenomena. He was, early in his career, assistant to Sir Humphry Davy.
3. Ampère, Andre-Marie (1775-1836), French physicist and mathematician. He elaborated the theory of electromagnetism and developed the electromagnet, the basis of applied electricity. He made large contributions to the development of mathematics, chemistry and philosophy, and was one of the great pioneer researchers into the mysteries of the universe.
4. "with the atomic theory of matter placed on ..." is the with-phrase construction: "with + noun + V-ed".

   e.g. They sat in the room with the curtains drawn.

   With the New Land discovered by Columbus all the arguments came to an end.
5. Dalton, John (1766-1844), English scientist. He developed atomic theory, and formulated the law of partial pressures for gases (Dalton's Law). He was the first to describe colour blindness accurately (Daltonism).

EXERCISES

I. Comprehension: Choose the best answer to complete the statements.

1. The author thinks that the practical fruits of science ____.
   a. are actually worthless
   b. should be highly appreciated
   c. are usually looked down upon by the public
   d. are all valuable, but the true significance of science is much more difficult to comprehend
2. When a theory is erected it usually predicts certain phenomena or relationships that ____.
   a. are open to doubt
   b. have not yet been thought to exist
   c. are above suspicion
   d. have undoubtedly known to all
3. If we fail to obtain the expected experimental verification of the predictions ____.
   a. the theory concerned will certainly be discarded
   b. a new theory will then be formulated
   c. the theory concerned will remain unchanged
   d. the theory concerned may be changed to some extent and thus improved
4. If we want to understand our environment today and to adapt ourselves to it, we must ____.
   a. more or less realize what the scientific attitude is

b. know something about the scientific method

c. keep informed of current discoveries

d. understand the foundation of our industrial science

5. The observations and inventions made by Babylonians and Egyptians did not lead to the statement of general principles, because ____.

a. they were too primitive

b. they were isolated and unrelated

c. they were not cumulative

d. they were based on speculation

6. The modern approach to nature is ____.

a. to explain why things happen

b. to explain how things happen

c. to seek answer in experiment

d. Both b and c

7. According to the author, we can best acquire an understanding of the essential character of scientific investigation through the study of physics because ____.

a. physics is basic to all sciences

b. physics accounts for the attitude and viewpoint of the scientific age

c. physics has a profound influence on scientific thought today

d. Both b and c

8. People who apply physics in practice are mostly those ____.

a. who are called physicists

b. who are called engineers

c. who are engaged in scientific researches

d. who are called physicians

9. "Natural philosophy" as mentioned in the text means ____.

a. the entire body of all natural sciences

b. a study before the 19th century that contained all physical sciences

c. the same as social sciences

d. a study concerned with the ultimate nature of reality

10. According to the text, which of the following statements is not true?

a. Scientists did not adopt the scientific method until the 16th century.

b. Before the 19th century it was very difficult for a single scientist to cover all the aspects of even one discipline.

c. The ancient scientists were interested in asking why rather than how.

d. Science means systematic knowledge possessed as a result of study or practice.

II. Vocabulary:

A. Choose the appropriate word or expression from the list below to fill in the blanks.

subject to　　indicative of　　originate from　　contribute to

known as	based on	related to	to some extent
in contrast	adapt to	by common consent	preoccupied with

1. An engine will be seriously damaged if it is ____ an overload.
2. The scientist has collected all the facts ____ the problem that he can find.
3. It took him several months to ____ college life.
4. Predictions ____ probability calculations have little value when applied to single isolated events.
5. The newborn need a long period of sleep time. ____, the aged need less sleep time.
6. When a substance is charged with electricity, it is said to be electrified, and this phenomenon is ____ electrification.
7. The sudden rise in temperature of a child may be ____ serious infection.
8. All substances conduct electricity ____, even such materials as paper, glass and rubber.
9. We hope your suggestion will ____ solving the problem.
10. All theories ____ practice and in turn serve practice.

B. Find the word or phrase in the paragraph numbered that means:

1. make due preparation for (2)
2. partly (2)
3. liable to, dependent on (2)
4. change a little so as to be suitable for (3)
5. on the other hand (5)
6. more and more rapid (5)
7. when everyone agrees (2)
8. that is to say (4)
9. showing, giving an indication of (8)
10. dividing into smaller pieces, parts (9)
11. always increasing (9)
12. actually (10)

III. **Cloze Test**: Find the correct word or phrase from the alternatives and fill in each space.

Mechanics is by far the oldest __1__ of physics, with Galileo as its forerunner, and Newton its founder. Mechanics may be defined as that science __2__ describes and predicts the conditions of rest or motion of bodies under the __3__ of forces. It is __4__ three parts: mechanics of rigid bodies, mechanics of deformable bodies, and mechanics of fluids.

Mechanics is a __5__ science, since it __6__ the study of physical phenomena. __7__, some associate mechanics with mathematics, while many consider it __8__ an engineering subject. Both these views are justified __9__. Mechanics is the foundation of most engineering sciences and is an indispensable prerequisite to their study. Its purpose is to explain and predict physical phenomena and thus __10__ the foundations for engineering applications.

1. a. subject b. branch c. discipline