大学英语考试过关必备系列丛书

基础科技英语阅读

BREAK THROUGH CET-4

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主编 高永照

安徽大学出版社

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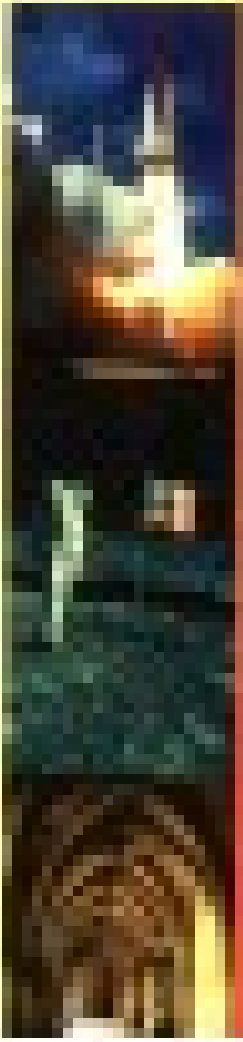

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出版说明

《大学英语》四级考试辅导系列丛书终于和广大读者见面了。

这套丛书的出版旨在进一步贯彻落实大学英语新大纲的精神，推动21世纪大学英语课程体系的改革，不仅着眼于帮助学生在英语听、说、读、写、译等方面打下扎实的基础，使之比较顺利地达到大学英语四级的基本要求，更着眼于对学生在外语能力的培养方面，使之再上一个新台阶。

这套丛书覆盖了近年来大学英语四级考试所涉及到的所有题型及四级后英语教学中的所需读本。它们是：《大学英语四级听力指导》、《大学英语四级写作指导》、《大学英语四级翻译指导》、《大学英语四级词汇语法及完型填空》、《大学英语四级口语指导》、《大学英语四级阅读理解150篇》、《大学英语四级模拟试题新编》、《基础科技英语阅读》、《大学英语最新多用词汇手册》等。

参加这套丛书编写的学校有：安徽大学、合肥工业大学、安徽师范大学、安徽医科大学、安徽农业大学、安徽中医学院、蚌埠医学院、阜阳师范学院、淮北煤师院、皖南医学院等。参加编写的人员都是在高校长期从事大学英语教学的老师，大家本着严肃认真、高度负责的精神，对照教学大纲的要求，努力编写好每一本书。但由于时间匆促，疏漏差错之处难免，敬请行家和读者指正。

编委会

1999年11月

前　言

为了全面贯彻教育部新修订的《大学英语教学大纲》，落实本科生“外语学习四年不断线”的规定，进一步提高大学生的素养和实际应用外语的能力，以适应 21 世纪对人才的要求，所以开展大学英语四级后专业英语教学显得尤为重要。为此，我们特编撰《基础科技英语阅读》一书，介绍当代科学技术领域的普通知识，以及与人们的日常生活密切相关的知识。本书可作为高等学校各科学生的专业英语阅读阶段的通用过渡教材，也可成为科技工作者进一步提高英语水平的帮手。

本书涉及面广，信息量大，包括了众多学科的现代文献资料。全书分 24 个单元，每个单元围绕一个主题，有 4 篇文章组成。为了加深阅读理解，第一篇设计为多项选择题，第二篇和第三篇为简答题，第四篇为翻译练习。教材可安排在第五、第六学期使用，教学时数每周 2 学时，全学年应不少于 70 学时，而且内容可以酌情删减，以便更好地为第七、第八学期的专业英语阅读奠定基础，顺利通过毕业前的英语水平考试。

本书所选文章皆出自国内外八九十年代出版的书籍、报刊和杂志，文字通俗流畅，规范易懂，内容以科普为主，富于现代性、知识性、趣味性和思辨性。

由于我们水平有限，本书的编撰肯定存在不少缺点甚至错误，恳请读者批评指正。

编　者

2000.1.26

Contents

Unit 1 Mathematics

Passage A

Probability

The mathematics to which our youngsters are exposed at school is with rare exceptions, based on the classical yes – or – no, right – or – wrong type of logic. It normally doesn't include one word about probability as a mode of reasoning or as a basis for comparing several alternative conclusions. Geometry, for instance, is strictly devoted to the 'if – then' type of reasoning and so to the notion that any statement is either correct or incorrect.

However, it has been remarked that life is an almost continuous experience of having to draw conclusions from insufficient evidence, and this is what we have to do when we make the trivial decision as to whether or not to carry an umbrella when we leave home for work. This is what a great industry has to do when it decides whether or not to put $50,000,000 into a new plant abroad. In none of these cases — and indeed, in practically no other case that you can suggest — can one proceed by saying, 'I know A, B, C, etc. are completely and reliably true, and therefore the inevitable conclusion is...' For there is another mode of reasoning, which does not say: "This statement is correct, and its opposite is completely false," but which says: "There are various alternative possibilities. No one of these is certainly correct and true, and no one certainly incorrect and false. There are varying degrees of plausibility — of probability — for all these alternatives. I can help you understand how these plausibilities compare; I can also tell you how reliable my advice is."

This is the kind of logic which is developed in the theory of probability. This theory deals with not two truth values — correct or false — but with all the intermediate truth values: almost certainly true, very probably true, possibly true, unlikely, very unlikely, etc. Being a precise quantitative theory, it does not use phrases such as those just given, but calculates for any question under study the numerical probability that it is true. If the probability has the value of 1, the answer is an unqualified "yes" or certainty. If it is zero (0), the answer is an unqualified "no", i.e. it is false or impossible. If the probability is a half (0.5), then the chances are even that the question has an affirmative answer. If the probability is a tenth (0.1), then the chances are only 1 in 10 that the answer is "yes".

It is a remarkable fact that one's intuition is often not very good at estimating answers to probability problems. For example, how many persons must there be in a room in order that the odds be favourable — that is, better than even — that there are at least two persons in the room with the same birthday? Remembering that there are 365 separate birthdays possible, some persons estimate that there would have to be 50, or even 100, persons in the room to make the odds better than even. The answer, in fact, is that the odds are better than even when there are 23 persons in the room; with 40 persons, the odds are better than eight to one that at least two will have the same birthday. Let us consider one more example: everyone is interested in polls, which involve estimating the opinions of a large group (say all those who vote) by determining the opinions of a sample. In statistics the whole group in question is called the 'universe' or 'population'. Now suppose you want to consult a large enough sample to reflect the whole population with at least 98% precision in 99 out of a hundred instances: how large does this very reliable sample have to be? If the population numbers 200 persons, then the sample must include 105 persons, or more than half the whole population. But suppose the population consists of 10,000 persons or 100,000 persons? In the case of 10,000 persons, a sample, to have the stated reliability, would have to consist of 213 persons: the sample increases by only 108 when the population increases by 9,800. And if you add 90,000 more to the population, so that it now numbers 100,000, you have to add only 4 to the sample! The less credible this seems to you, the more strongly I make the point that it is better to depend on the theory of probability rather than on intuition.

Although the subject started out in the seventeenth century with games of chance such as dice and cards, it soon became clear that it had important applications to other fields of activity. In the eighteenth century Laplace laid the foundations for a theory of errors, and Gauss later developed this into a real working tool for all experimenters and observers. Any measurement or set of measurements is necessarily inexact; and it is a matter of the highest importance to know how to take a lot of necessarily discordant data, combine them in the best possible way, and produce in addition some useful estimate of the dependability of the results. Other more modern fields of application are: in life insurance; telephone traffic problems; information and communication theory; game theory, with applications to all forms of competition, including business, international politics and war, modern statistical theories, both for the efficient design of experiments and for the interpretation of the results of experiments; decision theories, which aid us in making judgements; probability theories for the process by which we learn; and many more.

New Words and Expressions

trivial /ˈtriviəl/ *a*. 琐碎的;不重要的
plausibility /ˌplɔːziˈbiliti/ *n*. 似乎可能;似真性
quantitative /ˈkwɔntitətiv/ *a*. 数量的;定量的;
unqualified /ˌʌnˈkwɔlifaid/ *a*. 无限制的;完全的
affirmative /əˈfəːmətiv/ *a*. 肯定的;赞成的
intuition /ˌintjuːˈiʃən/ *n*. 直觉
odds /ˈɔdz/ *n*. 可能性;可能的机会
dice /dais/ *n*. 骰子
discordant /disˈkɔːdənt/ *a*. 不一致的;不调和的
in question 在考虑中的;在议论中的

Proper nouns:

Laplace　　　(人名)拉普拉斯

Gauss　　　(人名)高斯

Reading Comprehension:

Choose the best answer from the following choices:

1. Probability is ________.

   A. based on the classical yes－or－no, right－or－wrong type of logic

   B. strictly devoted to the "if－then" type of reasoning

   C. the same as the mathematics to which our youngsters are exposed at school

   D. a basis for comparing several alternative possibilities

2. The theory of probability ________.

   A. is concerned with two truth values — correct or false

   B. involves phrases such as possibly true, unlikely, etc

   C. is about all the intermediate truth values

   D. deals with a kind of logical reasoning

3. If the probability has the value of 0.4, then the chances are ________ that the answer is "no".

   A. 4 in 10　　B. 6 in 10

   C. 4 in 6　　D. 6 in 4

4. In a poll, to reflect the opinion of the whole population of 100,000 with at least 98% precision a sample would have to consist of ________ persons.

   A. 50,000　　B. 217　　C. 213　　D. 321

5. Which of the following statements is Not true?

A. The subject of probability commenced with games of chance.

B. The theory of probability was greatly developed by Laplace and Gauss.

C. Probability has important applications to many modern activities.

D. A lot of measurement or set of measurements is exact.

Passage B

Sets

The fundamental concept of calculus that interests us is the notion of a set. By a set we mean any collection of objects, either physical objects or mental objects. The usual kind of object which exists in the world about us is a physical object. The term "mental object" may not be as clear; by it we mean any object that has its existence in the mind of man. Perhaps more important than physical objects are the creatures of the mind — ideas. Abstract notions such as liberty, equality, fraternity — examples of mental objects — possess great power. As a mathematical example of a mental object, consider the number 5. Certainly, the number 5 is an important object, indeed a useful object, yet it has no existence in space. There is no physical object to which we can point and say: "That is the number 5."

Aristotle said that man is the rational animal; in the Golden Age[①] of Greece this comment was unquestionably appropriate. In the light of several thousand years of recorded history, however, it is doubtful that Aristotle's aphorism retains its force. There is, nevertheless, one aspect of man's makeup that has endured the test of time: man is the classifying animal. The desire to put together, either physically (as a small child does) or conceptually (as an adult does), all objects that have something in common is inborn in man. Each society, no matter how primitive, separates people into classes. In a well-developed society we may have such classes as "rich", "poor", "worker", "employer", while even the most primitive society recognizes classes such as "man", "woman", "adult", "child". It is not altogether unexpected, then, that the classifying urge should find expression in[②] mathematics. In fact, we shall see that the notion of a "class" or "set" is one of the fundamental concepts of mathematics.

The notion of a set, which has always been implicit in mathematics, was first explicitly introduced and developed by the brilliant mathematician G. Cantor in the late nineteenth century. By a set Cantor meant any collection of definite, well-distinguished objects — either of perception or thought. Thus a member of a set is either a physical object (for example, a piece of chalk) or a mental object (for example, the number five). By a specific set, then, we mean a definite collection of objects; thus a set is known once we know, of each object, whether or not the object is a member of the set. In other words, a set is defined if and only if[③] we can assert of each object either that the object is a member of the set or that the object is not a member of the set. It is the act of bringing together a number of distinct and separate objects that creates the set. This act of "bringing together" may be accomplished either physically or conceptually. As an example of the former, consider the bringing together that occurs when eleven football players congregate on a football field. Again, consider two football teams in competition on a football field. This is an example not merely of two sets (the two football teams), but a superset — "the players in the game". Thus the two teams, when brought together, produce a new entity. The act of bringing together can also be accomplished conceptually. For example, consider the collection of all mayors in a country. Normally these people are scattered across the face of the country; it is through the exercise of the intellect that we "bring together" this particular group of individuals, thereby creating the set of all mayors (of course, a fully attended mayors' convention would bring together physically the members of this set.).

New Words and Expressions

calculus /ˈkælkjuləs/ *n*. 微积分学
creature /ˈkriːtʃə/ *n*. 创造物;工具
fraternity /frəˈtəːniti/ *n*. 博爱;友爱
aphorism /ˈæfərizəm/ *n*. 格言;警句
retain /riˈtein/ *v*. 保留;保持
makeup /ˈmeikʌp/ *n*. 性格;组成;虚构
inborn /inˈbɔːn/ *a*. 天生的;先天的
conceptually /kənˈseptjuəli/ *ad*. 概念上地
implicit /imˈplisit/ *a*. 含蓄的;无疑的

perception /pə'sepʃən/ n. 感觉;知觉
assert /ə'sə:t/ *v*. 宣称;断言;维护
congregate /'kɔŋgrigeit/ *v*. 集合
superset /'sju:pəset/ *n*. 超集
entity /'entiti/ *n*. 统一体;实体

Notes:

1. Golden Age 黄金时代
2. (to) find expression in... 在……中表达出来
3. if and only if 在而且只有在……时;当且仅当,(用于数学和逻辑学中,可简写为 iff, *conj*. 即充分必要条件)

Proper nouns:

Aristotle (人名)亚里士多德
Greece (地名)希腊
Cantor (人名)康托尔

Reading Comprehension:

Short Answer Questions:

1. What do we mean by a set?
2. What did Aristotle say about man?
3. What did Cantor mean by a set?
4. What creats the set?
5. How may the act of "bringing together" be accomplished?

Passage C

The Empirical Nature of Pre-Hellenistic Maths

There is little doubt that mathematics arose from necessity. The annual flooding of the Nile Valley, for example, forced the ancient Egyptians to develop some system of re-establishing land boundaries; in fact, the word geometry means "measurement of the earth". The need for mensuration formulas was especially imperative since, as Herodotus (5th century B. C.) remarked, taxes in Egypt were paid upon the basis of land area. Marsh drainage, irrigation, and flood control converted the land along the Tigris and Euphrates rivers into a rich agricultural region. Similar projects undoubtedly were undertaken in early times in south-central Asia along the Indus and Ganges rivers and in eastern Asia along the Hwang Ho and Yangtze. The engineering, financing, and administration of such projects required the development of considerable technical knowledge and its attendant mathematics. Also, the need in agriculture for a usable calendar and the demand for some system of uniformity in barter furnished pronounced stimuli to mathematical development.

Thus there is a basis for saying that mathematics beyond primitive counting originated with the evolution of more advanced forms of society in certain areas of the ancient Orient during the 5th, 4th, and 3rd millenniums B. C., and that the subject was developed as a practical science to assist in engineering, agricul-