

ENGLISH

高等学校试用教材

英 语

第三册

• 数 学 类 •

大学外文系公共英语教研室 胡光国 冯卓 编

人民教育出版社

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内 容 提 要

本书为高等学校理科英语教材第三册(数学类),适于数学专业学生作为基础阶段英语教材,也可以作为阅读阶段教材。

本书共二十二课。每课内容包括:课文、注释、练习及阅读材料,书后附有总词汇表。书中材料多选自英美原著,专业内容较为广泛,语言现象较为丰富。

本书亦可供社会上有关人员提高阅读数学专业英语书刊的能力之用。

本书承山东大学金诗伯教授、喻名珊讲师审阅。

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前 言

本书为高等学校理科英语教材第三册(数学类),适于数学专业学生作为基础阶段英语教材,也可以作为阅读阶段教材。

本书共 22 课,每课配有一篇阅读材料。课文及阅读材料后均附有词汇、词组及注释。课文后还编有练习。书末附有总词汇表,以便查阅。全书授课时数约需 88 学时。

本书材料多选自英美原著。专业内容较为广泛,包括:数学分析、高等代数、高等几何、数学基础、概率、统计等。语言现象较为丰富,并注意到的数学专业英语常用句型结构及词汇。

本书由教研室主任张景桂教授审阅。在编写过程中还承蒙我校数学系周伯璩教授,唐述钊、郑维德、佟文庭副教授,许绍溥、仇庆久、苏维宜以及本教研室徐丽卿讲师等大力协助,谨在此一并表示衷心的感谢。

由于编者的专业知识和语言水平有限,书中一定还存在不少缺点和错误,请读者提出宝贵意见。

编 者

1981 年 9 月

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Lesson One

TEXT

WHAT IS MATHEMATICS?

Since you have probably had some previous experience with mathematics, it would seem to be a fair question to ask, "What is mathematics?"¹ If you give this question some thought, you probably feel pretty confident that you could tell whether or not a given printed page was mathematics². However³, to define precisely the term "mathematics" is not nearly so easy. It is one of the aims of this book to lead you to a better understanding of the nature of mathematics and the work of mathematicians.

In the suggested outside readings, you will encounter several answers to the question, "What is mathematics?" Some people contend that it is the most abstract of the sciences, others that⁴ it is more nearly akin to the arts of music, painting, and poetry. Still others⁵ pretend that it is only an elaborate game, played according to arbitrarily made-up rules. The British philosopher and mathematician Bertrand Russell once said, "... mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true." This rather shocking statement contains more truth than one might suppose. The sense in which it is true will become much clearer

later on. At any rate most people agree that it is a language ideally suited to the precise statement of complicated ideas. This is the reason that mathematics has become the universally accepted language of science⁶. Of course, mathematics is more than a mere language; it has its own literature containing many of the finest and purest creations of the human mind.

One of the distinguishing features of modern mathematics is its interest in the foundations and the logical structure of the subject. In fact, another of the views about mathematics is that mathematics is simply the recognition of patterns. In this view, the job of the mathematician is to recognize and abstract from dissimilar situations the elements which these situations have in common⁷. Once these properties, usually called axioms of the system, have been selected, the mathematician proceeds to prove that certain conclusions follow from these assumptions. For example, "If n is a positive integer, then the sum of the first n positive integers is $n(n+1)/2$," and "If $x^2=2$, then x is not a rational number," are typical mathematical statements. These are propositions which may be proved by a series of logical arguments based on a set of axioms for the natural numbers (that is, the counting numbers 1, 2, 3, ...). These statements can be shown to be logical consequences of the axioms and definitions which are a part of this mathematical structure.

— *Adapted from Fundamentals of Modern
Mathematics by J. M. Calloway*

NEW WORDS

1. **previous** ['pri:vjes] *a.* 以前的
2. **fair** [fɛə] *a.* 合理的, 公平的;
相当的
3. **pretty** ['priti] *a.* 相当大的; 优
美的 *ad.* 相当, 颇
4. **confident** ['kɒnfident] *a.*
有信心的, 自信的
5. **term** [tɜ:m] *n.* 术语; 学期
6. **aim** [eim] *n.* 目的
7. **encounter** [in'kauntə] *vt.*
遇到
8. **contend** [kən'tend] *vt.*
坚决主张
9. **art** [ɑ:t] *n.* 艺术; 美术
10. **music** ['mju:zik] *n.* 音乐
11. **painting** ['peintiŋ] *n.* 绘画
12. **poetry** ['pəuitri] *n.* 诗歌
13. **pretend** [pri'tend] *vt.*
借口; 自称
14. **elaborate** [i'læbərit] *a.*
精心制作的; 煞费苦心的
15. **arbitrarily** [ə'bitrɪrili] *ad.*
任意地
16. **made-up** ['meɪdʌp] *a.*
虚构的; 制成的
17. **philosopher** [fi'lɒsəfə] *n.*
哲学家
18. **shocking** ['ʃɒkiŋ] *a.* 令人震惊的
19. **sense** [sens] *n.* 道理; 感觉; 意思
20. **ideally** [ai'diəli] *ad.*
理想地; 空想地
21. **precise** [pri'sais] *a.*
准确的; 明确的; 精确的
22. **universally** [ˌju:ni'vɜ:səli] *ad.*
普遍地, 通用地
23. **literature** ['lɪtərɪtʃə] *n.*
文学; 文献
24. **distinguish** [dis'tɪŋɡwɪʃ] *vt.*
区别; 辨认出
25. **recognition** [ˌrekəɡ'nɪʃən] *n.*
识别; 承认
26. **recognize** ['rekəɡnaɪz] *vt.*
辨认, 认出
27. **dissimilar** ['di'similə] *a.*
不一样的, 不同的
28. **axiom** ['æksiəm] *n.*
公理; 原理; 原则
29. **conclusion** [kən'klu:ʒən] *n.*
结论
30. **assumption** [ə'sʌmpʃən] *n.*
假定, 设想
31. **typical** ['tɪpɪkəl] *a.*
典型的, 代表性的
32. **proposition** [ˌprəpə'zɪʃən] *n.*
命题; 建议
33. **argument** ['ɑ:gjʊmənt] *n.*

争论; 辩论

定义; 解说

34. definition [ˌdefɪˈnɪʃən] *n.*

PROPER NOUNS

Bertrand Russell (人名) 伯特兰·罗素

PHRASES AND EXPRESSIONS

(to) give ... a thought 考虑一下; 想一想

outside reading 课外阅读

(to) be akin to 同类的; 相近似的

according to 依据

later on 后来

at any rate 无论如何

(to) suit to 适合; 与...相称

more than 不仅; 超过

recognition of pattern 模式认辨

in this view 以这个观点

in common 共同; 公有

positive integer 正整数

rational number 有理数

natural number 自然数

NOTES TO THE TEXT

1. ..., it would seem to be a fair question to ask, "What is mathematics?"

..., 问“数学是什么?”这看来似乎是个合情合理的问题。

it 为先行代词, 做形式主语。动词不定式 to ask 是真正主语。

"What is mathematics?" 直接引语作宾语从句, 可用逗号隔开。

seem 为联系动词。to be a fair question 是不定式短语作表语。

2. If you give this question some thought you probably feel pretty confident that you could tell whether or not a given printed page was mathematics.

如果你对此问题略加思考(稍微想一想),你或许(大概)会(感到)十分自信,(你)能够分辨得出一页书是否(谈的)是数学。

少数作表语用的形容词(如本句中的 confident)也可有用 that 连接的宾语从句(或称特殊的状语从句),例如:

I'm sure that

We are certain that

You feel confident that

tell 常与 can, could, be able to 连用,作为辨别,分解释释。例如:

I cannot tell them apart.

我分不清他们。

How can you tell a Japanese from a Chinese?

你怎样辨别日本人和中国人呢?

whether 为连接词,引导 tell 的宾语从句,译为“是否”。用 whether 引导宾语从句的其它动词有 ask, know, wonder 等。另一情况是 whether 引导的状语从句,译为“不管”、“不论”。例如:

Whether he drives or takes the train, he'll be here on time.

不管他开汽车来还是乘火车来,他总是会准时到达的。

3. However, ...

然而,...

此处 However 因后有逗号和句子其它部分断开,故为连接词,译为“然而”(或“但是”)。如处于句中,则其前后均必须有逗号。如处于句末,则其前必须有逗号。但是当 however 前后无逗号,后面紧接形容词时,则应看作副词,译为“无论”。例如:

However great 无论多么大; However small 无论多么小

4. Some people contend that ..., others that ...

一些人坚决主张...,另一些人则坚持认为...

others 后面省略了动词 contend,以避免与前面分句重复。

5. Still others ...

还有一些人...

6. This is the reason that mathematics has become the universally accepted language of science.

这就是数学已成为公认的科学语言的原因。

连接词 *that* 引导 *the reason* 的同位语从句。*the reason that* 也可用连接副词 *why* 来代替。

7. ... to recognize and abstract from dissimilar situations the elements ...

...从不同的情况中辨认并抽出它们共有的本质来。

the elements 是 *to recognize and abstract* 的宾语, 原应紧接其后, 但此处因后面有由关系代词 *which* 引导的定语从句来修饰它, 所以放在 *from dissimilar situations* 的后面。

EXERCISES

I. Answer the following questions in English:

1. Why would it seem to be a fair question to ask, "What is mathematics"?
2. Is it easy to define precisely the term "mathematics"?
3. What do people think mathematics is?
4. What did the British philosopher and mathematician Bertrand Russell once say?
5. What is the reason that mathematics has become the universally accepted language of science?
6. Why do we say that mathematics is more than a mere language of science?
7. What is one of the distinguishing features of modern mathematics?
8. What mathematical statements in the text can be shown to be logical consequences of the axioms and definitions?

II. Put the following phrases into English:

1. 考虑一下这个问题
2. 感到很有信心
3. 更好地理解
4. 课外阅读
5. 相近似的
6. 根据
7. 可能定义为
8. 后来
9. 无论如何
10. 为大家所承认的科学语言
11. 不仅仅是一种语言
12. 对科目的基础和逻辑结构感兴趣
13. 共有
14. 正整数
15. 有理数
16. 一系列
17. 自然数
18. ...的一部分

III. Translate the following sentences into Chinese, paying special attention to the underlined words:

1. I do not know whether he is well or not.
2. Whether it rains or not, I will go tonight.
3. Whether they will come doesn't matter too much.
4. Please tell me the address of your school.
5. He used to tell his children a story every evening.
6. He couldn't tell which house it was.
7. I often can't tell him from his brother.
8. However difficult it may be, I must try to do it.
9. The composition is all right; there is room for improvement, however.

10. However, we will look into the matter later.

IV. Point out the infinitives in the following sentences and tell their functions:

1. Since you have probably had some previous experience with mathematics, it would seem to be a fair question to ask, "What is mathematics?"
2. However, to define precisely the term "mathematics" is not nearly so easy.
3. It is one of the aims of this book to lead you to a better understanding of the nature of mathematics and the work of mathematicians.
4. In this view, the job of the mathematician is to recognize and abstract from dissimilar situations the elements which these situations have in common.
5. Once these properties, usually called axioms of the system, have been selected, the mathematician proceeds to prove that certain conclusions follow from these assumptions.
6. These statements can be shown to be logical consequences of the axioms and definitions which are a part of this mathematical structure.

V. Translate the following into English:

1. 如果你考虑一下这个题目, 你会感到有信心把它解出。
2. 这篇文章的目的之一是引导你去更好的理解数学是什么东西, 和怎样利用它。
3. 有人认为数学是一种思维的方法, 也有人认为数学是一个探索 (exploration) 和发明的领域, 还有人认为数学是一种象音乐、绘画和诗篇一样的艺术。
4. 无论如何大家都同意, 数学是一种全世界文明的 (civilized) 民族都能理解的符号的语言。
5. 数学(内容)远远超过算术、代数和几何。
6. 从这个观点来看, 数学家的工作是发现新的数学, 并证明新的概念是正

确的。

7. 我们都知道,“如果 $x^2=2$, 则 x 不是有理数”是一个典型的数学式子。

READING MATERIAL

THIS IS MATHEMATICS

Why has mathematics become so important in recent years? Why is our government spending millions of dollars to educate more mathematicians? Can the new electronic brains solve our mathematical problems faster and more accurately than a person and eliminate the need for mathematicians?

To answer these questions, we need to know what mathematics is and how it is used. Mathematics is much more than arithmetic¹, which is the science of numbers and computation. It is more than algebra, which is the language of symbols, operations, and relations. It is much more than geometry, which is the study of shapes, sizes, and spaces. It is more than statistics, which is the science of interpreting data and graphs. It is more than calculus, which is the study of change, limits, and infinity. Mathematics is all of these — and more.

Mathematics is a way of thinking, a way of reasoning. Mathematics can be used to determine whether or not an idea is true, or, at least, whether it is probably true. Mathematics is a field of exploration and invention, where new ideas are being discovered every day². It is a way of thinking that is used to solve all kinds of problems in the sciences,

government, and industry. It is a language of symbols that is understood in all civilized nations of the world. It has even been suggested that mathematics would be the language that would be understood by the inhabitants of Mars (if there are any)³! It is an art like music, with symmetry, pattern, and rhythm that can be very pleasing.

Mathematics has also been described as the study of patterns, where a pattern is any kind of regularity in form or idea. This study of patterns has been very important for science because pattern, regularity and symmetry occur so often in nature. For example, light, sound, magnetism, electric currents, waves of the sea, the flight of a plane, the shape of a snowflake, and the mechanics of the atom all have patterns that can be classified by mathematics.

— *Adapted from Invitation to
Mathematics by William H.
Glenn and Donovan A. Johnson*

NEW WORDS

- | | |
|---|---|
| 1. government ['gʌvənmənt] <i>n.</i> 政府 | 关系; 联系 |
| 2. dollar ['dɒlə] <i>n.</i> 美元 | 7. statistics [stə'tistiks] <i>n., pl.</i> (用作单) 统计学; 统计; 统计数字 |
| 3. accurately ['ækjʊrɪtli] <i>ad.</i> 准确地, 精确地 | 8. interpret [in'tɜ:pɪt] <i>vt.</i> 说明; 阐明; 把...看作 <i>vi.</i> 翻译 |
| 4. eliminate [i'limineɪt] <i>vt.</i> 排除, 消除; 消灭 | 9. limit ['lɪmɪt] <i>n.</i> 极限; 界限 |
| 5. arithmetic [ə'riθmətik] <i>n.</i> 算术 | 10. infinity [in'fɪnɪti] <i>n.</i> 无穷大; 大量; 无穷 |
| 6. relation [rɪ'leɪʃən] <i>n.</i> | |

11. **reasoning** ['ri:zəniŋ] *n.*

推理, 推论

12. **exploration** [ˌeksplə:'reɪʃən] *n.*

探索; 考察

13. **civilize** ['sivilaɪz] *vt.*

使文明; 开化

14. **inhabitant** [in'hæbitənt] *n.*

居民, 住户

15. **Mars** [mɑ:z] *n.* 火星

16. **symmetry** ['sɪmitri] *n.*

对称(性)

17. **rhythm** ['riðəm] *n.* 韵律; 格律

18. **pleasing** ['pli:ziŋ] *a.*

使人愉快的

19. **describe** [dis'kraɪb] *vt.* 描写;

画(图形); 作(椭圆形状)运行

20. **regularity** [ˌregjʊ'lærɪti] *n.*

规则性; 整齐

21. **magnetism** ['mæɡnɪtɪzəm] *n.*

磁; 磁学

22. **flight** [flaɪt] *n.* 飞行

23. **snowflake** ['snəʊfleɪk] *n.* 雪花

24. **mechanics** [mi'kæniks] *n., pl.*

(用作单或复)力学, 机械学; 结构

25. **classify** ['klæsɪfaɪ] *vt.*

把...分类

PHRASES AND EXPRESSIONS

electronic brain 电脑

at least 至少

electric current 电流

NOTES TO THE TEXT

1. Mathematics is much more than arithmetic,

数学远非算术可比, ...

2. Mathematics is a field of exploration and invention, where new ideas are being discovered every day.

数学是(进行)探索和发明的一个领域。在这领域里, 每天都有一些新的概念发现。

关系付词 **where** 引导定语从句, 修饰 **a field of exploration and invention**. **where** 在从句中作地点状语, 修饰谓语动词 **are being discovered**.

3. It has even been suggested that mathematics would be the