English Presentation

Review & Share

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1. Review
   - 1.2 对照并列复句
   - 1.3 主次并列复合句
2. Share
3. Reference

Knowledge

常用句式：

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3. “……不……”，按照英语习惯选择合适句型

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  Instead of being a compound, it **is obviously** a mixture.
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汉语列复句的主次关系是隐含的，意义也是多种多样的，如含有原因、结果、方式、比较、让步等意义。翻译成英语时，根据原文意义的主次把主要动词译为谓语，次要动词译为非谓语动词或名词、介词等，或带从句。

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  By using our own hands we have attained the objective of ample food and clothing.

Area of Mathematics

History

Before the Renaissance, mathematics was divided into two main areas: arithmetic[1], regarding the manipulation of numbers, and geometry[2], regarding the study of shapes.

During the Renaissance, two more areas appeared. Mathematical notation led to algebra[3] which consists of the study and the manipulation of formulas. Calculus[4], consisting of the two subfields differential calculus and integral calculus, is the study of continuous functions. This division into four main areas–arithmetic, geometry, algebra, calculus–endured until the end of the 19th century.

[1] arithmetic n. 算术
[2] geometry n. 几何学
[3] algebra n. 代数
[4] calculus n. 微积分

At the end of the 19th century, the foundational crisis in mathematics and the resulting systematization of the axiomatic method[5] led to an explosion of new areas of mathematics. The 2020 Mathematics Subject Classification contains no less than sixty-three first-level areas. The main areas of mathematics are below:

[5] axiomatic method 公理化方法

- ✓ Number theory[6]
- Geometry
- ✓ Algebra
- Calculus and analysis
- Discrete mathematics[7]
- Mathematical logic and set theory[8]
- Statistics[9] and other decision sciences
- ✓ Computational mathematics[10]

[6] number theory 数论
[7] discrete mathematics 离散数学
[8] mathematical logic and set theory 数理逻辑与集合论
[9] statistics 统计学
[10] computational mathematics 计算数学

Number Theory began with the manipulation of numbers, that is, natural numbers($\mathbb{N}$) and later expanded to integers($\mathbb{Z}$) and rational numbers($\mathbb{Q}$).

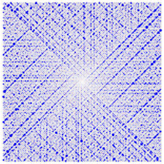

Fig. 1: This is the **Ulam spiral**, which illustrates the distribution of prime numbers.

Number theory was once called arithmetic, but nowadays this term is mostly used for numerical calculations. Number theory dates back to ancient Babylon and probably China. The modern study of number theory in its abstract form is largely attributed to *Pierre de Fermat* and *Leonhard Euler*. The field came to full fruition with the contributions of *Adrien-Marie Legendre* and *Carl Friedrich Gauss*.

Many easily stated number problems have solutions that require sophisticated methods, often from across mathematics. A prominent example is Fermat's Last Theorem[11]. This conjecture was stated in 1637 by Pierre de Fermat, but it was proved only in 1994 by Andrew Wiles. Another example is Goldbach's conjecture[12]. Stated in 1742 by Christian Goldbach, it remains unproven despite considerable effort.

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[11] Fermat's Last Theorem 费马大定理

[12] Goldbach's conjecture 哥德巴赫猜想

Number theory includes several subareas, including:

- analytic number theory[13]
- algebraic number theory[14]
- geometry of numbers[15]
- diophantine equations[16]
- transcendence theory[17]

[13] analytic number theory 解析数论
[14] algebraic number theory 代数数论
[15] geometry of numbers 几何数论
[16] diophantine equations 丢番图方程
[17] transcendence theory 超越理论

Algebra is the art of manipulating equations and formulas. *Diophantus* and *al-Khwarizmi* were the two main precursors of algebra. Algebra became an area in its own right only with *François Viète*, who introduced the use of variables for representing unknown or unspecified numbers.

Fig. 2: The Rubik's Cube group is a concrete application of group theory

Until the 19th century, algebra consisted mainly of the study of linear equations(presently linear algebra[18]), and polynomial equations in a single unknown, which were called algebraic equations. During the 19th century, mathematicians began to use variables to represent things other than numbers. The scope of algebra thus grew to include the study of algebraic structures. This object of algebra was called modern algebra or abstract algebra.

Some types of algebraic structures have useful and often fundamental properties, in many areas of mathematics. Their study became autonomous parts of algebra, and include:

- group theory[19]
- field theory[20]
- vector spaces[21]
- ring theory[22]

- commutative algebra[23]
- homological algebra[24]
- Lie algebra and Lie group theory[25]
- Boolean algebra[26]

[18] linear algebra 线性代数
[19] group theory 群论
[20] field theory 域论
[21] vector spaces 向量空间
[22] ring theory 环论
[23] commutative algebra 交换代数
[24] homological algebra 同调代数
[25] Lie algebra/Lie group theory 李代数/李群
[26] boolean algebra 布尔代数

Computational mathematics is the study of mathematical problems that are typically too large for human, numerical capacity. Numerical analysis studies methods for problems in analysis using functional analysis and approximation theory; numerical analysis broadly includes the study of approximation and discretization with special focus on rounding errors[27]. Numerical analysis and, more broadly, scientific computing also study non-analytic topics of mathematical science, especially algorithmic-matrix-and-graph theory. Other areas of computational mathematics include computer algebra and symbolic computation.

[27] rounding errors 舍入误差

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Reference

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Thanks!