第二课 数和数学

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Unit 2

NUMBERS AND MATHEMATICS

It is said that mathematics is the base of all other sciences, and that arithmetic, the science of numbers, is the base of mathematics. Numbers consist of whole numbers (integers) which are formed by the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 and by combinations of them. For example, 247—two hundred and forty seven[1]—is a number formed by three digits. Parts of numbers smaller than 1 are sometimes expressed in terms of fractions, but in scientific usage they are given as decimals. This is because it is easier to perform the various mathematical operations if decimals are used instead of fractions. The main operations are: to add, subtract, multiply and divide; to square, cube or raise to any other power; to take a square, cube or any other root and to find a ratio or proportion between pairs of numbers or a series of numbers. Thus, the decimal, or ten-scale, system is used for scientific purposes throughout the world, even in countries whose national systems of weights and measurements are based upon other scales. The other scale in general use nowadays is the binary, or two-scale, in which numbers are expressed by combinations of only two digits, 0 and 1. Thus, in the binary scale, 2 is expressed as 010, 3 is given as 011, 4 is represented as 100, etc. This scale is perfectly adapted to the 'off-on' pulses of electricity, so it is widely used in electronic computers: because of its simplicity it is often called 'the lazy schoolboy's dream'!

Other branches of mathematics such as algebra and geometry are also extensively used in many sciences and even in some areas of philosophy. More specialized extensions, such as probability theory and group theory, are now applied to an increasing range of activities, from economics and the design of experiments to war and politics. Finally, a knowledge of statistics is required by every type of scientist for the analysis of data. Moreover, even an elementary knowledge of this branch of mathematics is sufficient to enable the journalist to avoid misleading his readers, or the ordinary citizen to detect the attempts which are constantly made to deceive him.

人们都说数学是其它各门科学的基础，而算术，研究数的科学，又是数学的基础。数包括整数，整数由数字 0，1，2，3，4，5，6，7，8 和 9，以及它们的组合构成。例如 247，二百四十七，就是由 3 个数字组成的数。比 1 小的那些数，有时候用分数来表示，但是用于科学则以小数来表示。这是因为用小数代替分数，会使多种多样的数学运算更加容易。主要的运算有：加法、减法、乘法、除法；求平方、立方及任意次方；求平方根、立方根、以及任意次方根；还有找出数对或数列的比例、比率。所以小数，或者说 10 进制小数系统在全世界都通用于科学计算，即使在那些本国的重量、度量单位使用其他进位制的国家。现今，其他通用的进位制还有 2 进制。在 2 进制里，数仅用两个数字：0 和 1，以及它们的组合来构成。在 2 进制里，2 表示成 010，3 写作 011，4 则是 100，等等。这种进位制和电脉冲的“开”、“关”高度吻合，所以广泛地用于电子计算机。因为这种进位制很简单，有人常常称它是“懒学生的梦想”。

数学的其他分支如代数、几何都广泛地应用在许多科学中，甚至应用在哲学的一些领域。更加专业化的数学分支如概率论、群论现在也在日益扩大的活动领域得到应用，从经济学、实验的设计直到战争、政治。最后各类科学家都需要统计学的知识，以便分析数据。而且只要稍稍具备一点这个数学分支的知识，就可以使新闻工作者免于误导他的读者，也可以使普通人觉察那些常常想要愚弄他们的企图。