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 o, 1, 2, 3, 4, 5, 6, 7, 8 and 9 and by combinations of them. For example, 247—two hundred and forty seven—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, o and 1. Thus, in the binary scale, 2 is expressed as 010, 3 is given as 011, 4 is represented as 111, 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.

Comprehension

1. What is the relationship of mathematics to the other sciences?
2. What is die science of numbers called?
3. Name a two-digit integer.
4. Name two ways of expressing parts of die number *one* (unity)•
5. Name the common arithmetical operations. Using actual numbers, give examples of each.
6. What are the two number-systems commonly used through­out the world?
7. Give examples of numbers in the binary system.
8. What are die advantages of each system?
9. Name some other branches of mathematics.