# THE PRINCIPLES AND PRACTICE OF ARITHMETIC, COMPRISING THE NATURE AND USE OF LOGARITHMS, WITH THE COMPUTATIONS EMPLOYED BY ARTIFICERS, GAGERS AND LAND-SURVEYORS. DESIGNED FOR THE USE OF STUDENTS

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The principles and practice of arithmetic, comprising the nature and use of logarithms, with the computations employed by artificers, gagers and land-surveyors. Designed for the use of students by John Hind

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JOHN HIND

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# ADVERTISEMENT.

In the present Treatise it has been the Author's endeavour to combine what is necessary of the *Philosophy* of the *Science of Arithmetic* with the *Practice* of the *Art of Numbers:* but it is not the purpose of the work to enter into the *History* of *Arithmetic*, which has been so amply treated of in many other publications, nor to attempt any eulogium upon its merits and practical utility, which are every day so fully evinced: it is considered sufficient to place before the student an outline of the plan which has been adopted in the arrangement, with a short account of the more important divisions, leaving him to consult the *Table of Contents* for particular information respecting what may be found in their more minute details.

The *first* Chapter commences with the elementary Definitions; it then proceeds to the explanation of *Notation* and *Numeration*, which are both exemplified in a great variety of instances; and concludes with the consideration of the *Fundamental Operations* of the Science as applied to *pure* or *abstract* numerical magnitudes.

In the *second* Chapter, the Application of the Fundamental Operations has been extended to *mixed*

or *concrete* numerical magnitudes, consisting of various denominations.

The *third* Chapter treats of the first Principles of the *Rule of Three*, sometimes called the *Golden Rule;* and it comprises a collection of examples illustrating the different views of the subject.

The *fourth* Chapter contains *The Doctrine of Fractions*, usually termed *Vulgar Fractions;* concluding with some of its applications to practical purposes.

The *fifth* Chapter developes *The Theory of Decimals*, commonly called *Decimal Fractions;* and it points out some of the important uses to which they are more peculiarly adapted.

In the *sixth* Chapter are discussed the Doctrines of *Ratio* and *Proportion*, from the *Principles* of which are deduced several Rules of the greatest consequence in the affairs of *Commerce;* and it concludes with the solution of a few miscellaneous questions, explaining some technical terms.

The *seventh* Chapter contains the Practice of *Involution* and *Evolution*, with *The Arithmetic of Surds* or *Irrational Quantities.*

The object of the *eighth* Chapter is *The Nature* and *Properties of Logarithms*, derived from the simplest principles; and the *practical* advantages afforded by *Logarithmic Tables* are briefly pointed out in appropriate examples.

The *ninth* Chapter is *The Application of Arithmetic to Geometry:* and the calculations of *Artificers, Gagers* and *Land-Surveyors* are concisely explained and exemplified in it.

In this chapter will also be found a short account of the *Imperial Weights* and *Measures*, and their origin and relation to each other; as well as of the *Calendar* adopted in the time of *Julius Cæsar*, and its subsequent improvement in the time of *Pope Gregory* the *Thirteenth*, with all the requisite Calculations worked out.

The rest is an Appendix, in which some of the rules have been derived from the most elementary principles, upon the extension of which the present system of Arithmetic is generally established.

Throughout the work, it has been attempted to trace the source of every rule which is given, and to investigate the reasons upon which it is founded: and by means of *particular* examples comprising nothing but what is *common* to every other example of the *same kind*, to confer upon Arithmetic that kind of evidence which is attainable in Geometry, or any other demonstrative science.

*Single* and *Double Position* are entirely omitted, as most of the examples usually given to illustrate these rules, may be solved by the principles here explained, not to mention that they are merely *Algebraical Formulæ* enunciated at length.

No notice has been taken of *Arithmetical* and *Geometrical Progression*, of *Permutations* and *Combinations*, and of *Annuities* and *Reversions*, because they all depend upon *Formulæ* expressed by general symbols, which the student would find a difficulty in making use of, without at least a knowledge of the *Notation* and *Fundamental Operations* of *Algebra;* in addition to which, they very seldom occur

to any one who is not engaged in *Scientific* Speculations, or in *Professional* Calculations.

It may perhaps be objected that the *Examples for Practice* given in the work, are too numerous for a rapid advancement in the subject; but the student will recollect that he has no occasion to trouble himself with the *rest*, when a *few* of them have rendered him perfect in the Application of the Rules; although it must be observed, that a *Facility* in Arithmetical Calculations is of all things the most indispensable, in the formation both of the future *Analyst*, and of the *Man of Business*.

CAMBRIDGE,
*December* 7, 1839.

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