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THE DIRECTLY-USEFUL TECHNICAL SERIES requires a few words by way of introduction. Technical books of the past have arranged themselves largely under two sections: the Theoretical and the Practical. Theoretical books have been written more for the training of college students than for the supply of information to men in practice, and have been greatly filled with problems of an academic character. Practical books have often sought the other extreme, omitting the scientific basis upon which all good practice is built, whether discernible or not. The present series is intended to occupy a midway position. The information, the problems, and the exercises are to be of a directly useful character, but must at the same time be wedded to that proper amount of scientific explanation which alone will satisfy the inquiring mind. We shall thus appeal to all technical people throughout the land, either students or those in actual practice.

THE EDITOR.

AUTHOR'S PREFACE

THE following work is an endeavour to treat the elementary portions of what is usually called "Practical Mathematics" in a thorough and practical manner, suitable for elementary students of technical schools and for home study. Although a great many books on the same subject already exist, the Author has been unable to find one dealing with the necessary matter in sufficient detail and with a sufficient amount of engineering application to meet the needs of his own students. For private study, too, he is of the opinion that the existing text-books treat the elementary matter in a manner too cursory to really fulfil their object. The treatment in the following pages, therefore, has been developed from his own lecture notes and class instruction on the subject, and numerous diagrams have been introduced to assist in making the work clear.

Many will think, no doubt, that the title "Arithmetic for Engineers" is not sufficiently comprehensive for the matter contained, but it was found impossible to frame a short original title to adequately describe the contents. An examination of the examples and exercises should show that the whole of the matter is *directly useful*; all purely academic work such as Highest Common Factor, Recurring Decimals and the like being discarded. Wherever possible the examples are *truly practical*, *i. e.*, are problems *actually met with* in the Drawing Office, Workshop and Laboratory, while the data are of correct dimensions. Such examples should stimulate the reader's interest in the mathematical work and show the applications of the principles to practice; at the same time a little general engineering knowledge will be gained. Even at the risk of becoming verbose, all matter is treated at length, *every principle being followed by worked examples*. Where slight variations of the problem may cause difficulty to the beginner, or where special precautions have to be observed on certain points, *several* illustrative examples are given. A case in point is that of the extraction of a square root on pp. 102 *et seq.* For the private student this is particularly necessary, as he is often unable to obtain guidance in working a new problem which presents features slightly different from those in the example worked to illustrate the principle.

Stress has been laid, in Chap. II, on limiting the number of figures to be given in a result, as class-room experience shows that many students will persist in using, and stating in results, far more figures than are necessary from the practical point of view, where

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