

Similar devices, more or less illuminating to the young student, are shown in connection with the discussion of all the fundamental operations. A prominent place is given to interesting material in elementary number theory.

For half a century Professor Fazzari has been a distinguished writer on the history of science. This interest is reflected in the well-chosen historical and philological notes which appear at the end of each chapter. The exercises in 31 pages at the end of the work are selected from ancient and modern sources to illustrate curious and interesting properties of numbers.

The fourth edition is, as the preface states, practically unchanged. On its face, this edition is extremely modern, as it is dated "Palermo, 1918" and the author's preface is dated "Palermo, September, 1918.

LOUIS C. KARPINSKI.

*Lehrbuch der darstellenden Geometrie für technische Hochschulen.*

By EMIL MÜLLER, professor of mathematics at the technical school of Vienna. Second volume, final instalment. Leipzig, Teubner, 1916. 130-360 pp.; 141-328 figures.

The first volume of Professor Müller's book was reviewed in the BULLETIN, volume 16, page 136, and the first instalment of the second volume in volume 20, page 258. The present part is concerned with oblique axonometry and central perspective. The former is founded on Polke's theorem, a number of alternate proofs of which are given. As in the preceding parts, the text is well supplied with historical and bibliographical foot-notes, emphasizing that the science was of slow, gradual, and international growth.

The treatment of general axonometric representation is so exhaustive as to make the book hardly suitable as a text, but it is all the more serviceable as a handbook. A full discussion of æsthetic advantages and disadvantages is included, and the method is critically compared with those met with in the earlier parts of the book. Between this subject and central perspective a chapter on oblique projection is inserted, with applications to circles, spheres, and surfaces of revolution. A goodly list of exercises follows each chapter.

The development of the principles of perspective is particularly clear and readable. It is first presented independently, then shown to be approachable also from the  $h$ ,  $v$  drawings, or from axonometric ones. The mathematical standpoint

is never lost sight of, although no pains are spared to bring out desired artistic effects. The purely theoretical development is followed by a description of various devices to aid in drawing, including parallel rulers, Nicholson's centrolinead, Schilling's three-bar ruler, and a number of linkages. The final chapter contains an elaborate application of the method to the representation of curves and surfaces, including arches, trusses, etc.; a few pages are given to explaining the meaning and uses of photogrammetry.

The book is provided with a full index, and a list of all the authors cited.

VIRGIL SNYDER.

*The Method of Least Squares with Applications* (third edition)

By DANA P. BARTLETT. A. D. MacLachlan, 502 Boylston St., Boston, 1915. 143 + xi pp. Price \$2.25.

FOR clear, concise statement in readable form and for systematic treatment of the whole range of ordinary applications of the method, we have not found the equal of this text by Professor Bartlett, of the Massachusetts Institute of Technology. These qualities have led the reviewer to adopt it for use covering this phase of the course with his students in "the mathematics of statistics."

The author has avoided making provision for special lines of work in which the method is applied, and so the instructor is free in the development when such special applications are needed. A well chosen example with complete solution follows every important development of the theory, but the 155 well graded examples are arranged like the punctuation marks in a certain school-boy's composition, which had none in the body of it but an ample supply of all sorts that might be needed at the close with the instruction "Put them in where you may wish."

The appendix gives the elements of the theory of probability, a bibliography, and three tables useful in applying the method. Throughout the text, references are made to more extended treatments in standard texts.

CHARLES C. GROVE.

*Text-Book of Mechanics*. Vol. VI. *Thermodynamics*. By LOUIS A. MARTIN, JR. New York, Wiley, 1916.

THIS book, which is the sixth volume of a series of texts on mechanics, is a remarkably compact and comprehensive