

revolution and spiral forms, a greater part of the space being devoted to the torus and the spiral stairway. The closing section is concerned with the problem of representing cylinders, cones, and spheres having an orthogonal network of lines on their surface. This leads at once to drawing maps of the earth's surface and of the celestial regions. Throughout the last chapter numerous and really wonderful examples of regular and semiregular forms occurring in nature are pointed out, and in a few cases the principles of the text are employed in drawing a flower or plant.

While a portion of the book could be read with advantage by the beginner, it would seem to the reviewer to be most useful to the teacher in suggesting methods and examples. It is much more mathematical than American text-books on descriptive geometry, and less extensive than many of the German books on that subject, such as Geyger. On the other hand it does not cover the field of stereometry in general on such an ambitious scale as does Dr. Holzmüller in his four-volume *Elemente der Stereometrie*. In many cases the figures are rendered unnecessarily complicated by the attempt to use the same figure for a number of examples, often separated by many pages. The author has undoubtedly succeeded in thoroughly discussing the limited field he selects, and the reader who covers the book carefully will be certain to gratify the author's desire to increase his power of space perception.

D. D. LEIB.

Plane and Spherical Trigonometry and Four-Place Tables of Logarithms. By W. A. GRANVILLE. Boston, Ginn and Company, 1909. xi + 264 + 38 pp.

THIS is one of the excellent series of elementary mathematical text-books which are published under the supervision of Professor P. F. Smith, of the Sheffield Scientific School. The present volume is up to the standard for which the series has already earned a reputation.

The number of text-books in trigonometry is growing larger every day, but there always seems to be room for one more, provided it is written in a modern spirit so as to satisfy the needs of the present day. This book covers the usual topics and contains all the trigonometry that is usually taught in the undergraduate classes of colleges and technical schools. The demonstrations are simple and exceedingly clear, and the book

is abundantly rich in exercises. With regard to the numerical work it is evident that the author believes in the pedagogic value of accuracy and the proper arrangement of computation. Great prominence has also been given to graphical methods.

The book differs from the general type of text-books in trigonometry in several points. Under each case in the solution of triangles there are two sets of examples, one in which the angles are given in degrees and minutes, and another in which they are expressed in degrees and the decimal part of a degree. Another feature is the treatment of spherical trigonometry, in deriving the formulas of which the author makes use of the principle of duality, which is stated in the following form: "If the sides of a general spherical triangle are denoted by the Roman letters a, b, c , and the supplements of the corresponding opposite angles by the Greek letters, α, β, γ , then, from any given formula involving any of these six parts, we may write down a dual formula by simply interchanging the corresponding Greek and Roman letters." This method has many advantages, a great part of the work required in deriving formulas being done away with.

The general appearance of the book is very attractive. The cuts, the typography, and the arrangement of matter on the page are excellent.

JACOB WESTLUND.

Dynamique Appliquée. Par L. LECORNU. Paris, Octave Doin, 1908. 534 pp. 5 francs.

Hydraulique Générale. Par A. BOULANGER. Paris, Octave Doin, 1908. Vol. 1, xvi + 382 pp. Vol. 2, vii + 299 pp. 5 francs each.

(Encyclopédie Scientifique. Publiée sous la direction du Dr. Toulouse.)

M. LECORNU's textbook on applied mechanics is divided into four parts: Résumé of the chief results of rational mechanics; Mechanical properties of materials; Applications of dynamics; Theory of machines.

The first part occupies seventy-one pages, and furnishes the theoretical foundation for the rest of the book. It is a summary of the well-known equations of translations, moments; kinematics of a point, a set of points, and a solid; dynamics of particles, momentum, lifting force; statics of systems, virtual work, restraints, equilibrium of solids and of jointed systems,