

SHORTER NOTICES.

New Analytic Geometry. By PERCY F. SMITH and ARTHUR SULLIVAN GALE. Boston, Ginn and Company, 1912. x+342 pp.

At the present time when there are so many text-books which treat of analytic geometry, a new book in order to justify its publication should be original both in its methods and in the material which it contains. If this is taken as our standard, Smith and Gale's *New Analytic Geometry* ought certainly to find a place among the modern college text-books of elementary mathematics. The authors have succeeded in getting away from the beaten and orthodox path followed by a majority of similar text-books and have given to the subject a treatment which is in harmony with progressive ideals in college mathematics.

In the selection of material the book is unique, if we except with some reservation a few other books such as Lambert's *Analytic Geometry* or Smith and Gale's *Introductory Course in Analytic Geometry*. In the table of contents are to be seen such chapter headings as Transcendental curves and equations, Functions and graphs, Parametric equations and loci, Empirical equations, etc. A hasty glance is sufficient to give the impression that the *Analytic Geometry* is not a treatise on conic sections, the discussion of that important class of curves being limited to one short chapter of thirty-five pages. The authors have emphasized the fact that they are presenting a general treatment of loci problems, and that corresponding equations can be determined and interpreted regardless of their forms or of the kinds of coordinates which are used. The aim seems to have been not to study intensively a limited class of curves and equations but rather to develop general laws which can be applied equally well to all parts of the field.

The teacher of calculus and of more advanced mathematics is naturally pleased to see the new chapters on transcendental curves and parametric equations as well as an excellent chapter on polar coordinates. In these parts of the book are found a great many of the typical equations and curves which are used in illustrations in calculus and which appear very frequently in technical work. More space has been given to

transcendental and parametric equations than to the equations of the conic sections. It must, however, be admitted that, from the standpoint of the student of technology, this division of space can be justified.

A chapter on Empirical equations is, for a text-book of analytical geometry, decidedly an innovation. However, the treatment is far from adequate and lacks almost completely any evidence of mathematical rigor. Such a chapter, however, may be the means of stimulating the reader to investigate more carefully this important field of applied mathematics. It is exceeding doubtful whether any treatment of the subject of curve fitting can be so condensed and simplified as to find a place in a text-book of analytic geometry and at the same time be adequate from a strictly mathematical point of view.

Ninety-seven pages of the text are given over to the analytical geometry of space. This part of the book, however, seems to lack much of the originality and freshness which characterizes the rest of the book. If the treatment is superior to the same parts of other text-books it is due to the most excellent list of problems which are included.

In their presentation of the subject the authors have used a modified form of the euclidean method. The important theorems are formally stated and the formal proof ending with the usual Q. E. D. follows. Among these important theorems are found those for the distance between two fixed points, the slope-intercept equation of the straight line, the angle between two lines, the equation of a circle, etc. Other theorems are presented as problems. The problem is stated and the solution given, then the result of the solution is summarized in a theorem or in a set of general rules to be used in solving specific problems of the same general character. A third method of presentation is also used which makes use of an illustration. For example, the method of deriving the equation of the tangent at any point on a curve (see page 190) is developed by means of a solution of the problem for the cubical parabola. While this illustrative method may be criticized because of its lack of rigor and generality, it is certainly quite often much more intelligible to the average student than a long and abstract presentation of the same thing. By using these three ways of presentation the strict euclidean method, which was used in the former treatise by the same authors, has lost much of its harshness.

The mechanical side of the book has been splendidly executed and is almost entirely free from errors. The use of italics and heavy type is not overdone, but is still sufficient to emphasize the really important things of the text. The figures are abundant and well drawn. The problems are numerous and have been selected because they illustrate something, rather than because of their difficulties.

Taken as a whole, the book is thoroughly up to date and well written. Although it is more of a drill book than a treatise, it ought nevertheless to furnish the student with a good foundation for a later course in calculus. It is a book which should be a stimulus to every teacher who is in sympathy with the international movement towards improvement in the curriculum and the methods of instruction in college mathematics.

EDWIN R. SMITH.

Technical Trigonometry. By HORACE WILMER MARSH. New York, John Wiley and Sons, 1914. x+232 pp.

THIS book gives a clear and usable knowledge of the trigonometry underlying the industrial and technical studies. The first chapter is devoted to an explanation of logarithms, while the second and third chapters are given to the solution of right and oblique triangles with their applications. It is in the applications that this book differs from the traditional trigonometries. The exercises are chosen from engineering, physics, manufacturing, etc. A few of the types of problems given are: equilibrium on an inclined plane, bevel gears, spiral gear cutter, dovetail joints, two point ball bearing, nuts, flange angles, tangent galvanometer, track turnout, roof truss, length of belts, concrete stand pipes, sewer construction. Each problem is accompanied by a very well executed drawing. These three chapters cover 186 pages or about 9/11 of the book. Many technical terms are used and explained.

The fourth chapter (13 pages) deals with the functions of the sum and difference of two angles and the functions of multiple angles. The proofs of most of the formulas are left as exercises. No other exercises such as proving identities, solving trigonometric equations, solving practical problems, etc., are given. In the last chapter, namely chapter five, the slide rule is explained. At the end of the book are found tables on length, area, volume, weight, decimal equivalents of