Questions d'Arithmétique, by B. Niewenglowski. Paris, Librairie Vuibert, 1927. viii+225 pp.

This is an entirely elementary book on the rudiments of the theory of numbers, in which induction and proof are agreeably mixed to bring out the spirit of the arithmetical approach. It is difficult, however, to see for what class of readers the work is intended. From an American point of view it is too elementary and insufficiently scientific to be of interest to even first-year college students. It is of about the grade that would stimulate an intelligent high school senior with a taste for abstract mathematics.

It is unnecessary to go into detail on the contents of the book. Chapter I is devoted to curiosities; Chapter VIII to the theorems of Fermat and Wilson, including the elements of the theory of quadratic residues and the law of reciprocity; Chapter IX, the last in the book, gives numerous instructive numerical examples on the Pellian equation. The treatment throughout is more like what one would expect to find in a book of mathematical curiosities than that appropriate to a serious treatise on the theory of numbers. Nevertheless the book is highly interesting, with many fresh touches, and one that is likely to stimulate young readers. Misprints are frequent, but not serious to fairly sophisticated readers. Some of them might bother the beginners for whom the book seems to be written.

E. T. Bell

Vorlesungen über Höhere Geometrie. By Felix Klein. Third Edition. (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Band XXII.) Berlin, Julius Springer, 1926. viii+405 pp.

Among the many courses of lectures by Klein that began to appear over forty years ago in "autographic" editions none has been more stimulating than that on Higher Geometry which first appeared in 1893. It was based on the ideas developed in his famous Erlanger Program of 1872 entitled *Vergleichende Betrachtungen über neuere geometrische Forschungen*, in which he established the group of transformations as the fundamental principle of classification in geometry. The course of lectures on Higher Geometry exhibited the whole of geometry from the group-theoretic point of view.

The original edition consisted of two volumes. The book now under review contains what is virtually a reprint of the first of these volumes, Professor W. Blaschke acting as editor. The mathematical public will hail this new edition, not only because in printed form it is much easier to read, but also because the former editions are difficult to obtain. It is one of the classics of our mathematical literature and should be permanently available.

The second volume of the original edition was devoted to Lie's theory of groups of transformations. In view of more recent developments a new edition of this second volume would have required extensive revision and rewriting. Professor Blaschke has, therefore, omitted it entirely from the new edition. In place of it, he has added one hundred pages of entirely new material, giving in five chapters some of the more recent developments in higher geometry. These last five chapters are especially interesting and stimulating. The first of these, by Professor Blaschke, gives an account of Study's line geometry. Professor Radon contributes the second of these chapters which is devoted to a discussion of the author's mechanical derivation of Levi-Civita's parallel displacement. The third chapter, apparently a joint product of Professors Blaschke and Artin, is devoted to analysis situs. It is of special interest to American readers in that it reproduces Alexander's elegant proof of the deformation theorem of Tietze. Professor Radon contributes also the fourth of these chapters which is devoted to a variety of geometric interpretations in the theory of partial differential equations and the calculus of variations. The last of these chapters furnishes a geometric treatment of the theory of elementary divisors. Each of these chapters is enriched by an adequate bibliography of the subjects under discussion. It is to be hoped that some of our younger devotees will receive inspiration from this work, with a view to bringing geometry back to the front of the stage, from which it has been temporarily crowded by the recent advances in analysis.

J. W. YOUNG

The Evolution of Scientific Thought from Newton to Einstein, by A. d'Abro. New York, Boni and Liveright, 1927. 544 pp.

Explaining scientific theories to people with small knowledge of the technique used by the original developers is the cause of much difficulty in modern thinking. This book is an attempt to present the development of space-time in a manner understandable to a person unfamiliar with the mathematical tools used by the physicists in the new theories.

The author uses the only possible method—that of first acquainting the reader with the foundations of the mathematical and physical problems to be discussed. We find in Chapters I–V and VII an excellent sketch of the non-euclidean geometries particularly from Riemann's point of view. In Chapters VI and VIII–XII the physical questions of time, classical relativity and electromagnetics are dealt with.

We are surprised at the amount of insight it is possible to give without the use of mathematical manipulation. Having wondered how much a student of first year calculus (which is, after all, about as much mathematics as the average layman has in his background, if not more) would make out of such a treatment, we tried Chapter VII on one of our students. This chapter introduces the idea of the curvature of space. To our surprise, the idea was grasped rather well from the author's explanation.

The next section (Chapters XIII–XXII) consists of a most accurate and altogether excellent account of the restricted theory of relativity. One of the most interesting chapters is the one devoted to paradoxes (XXII).

Part three deals with the general theory. As the task is much more difficult here, in view of the extremely complicated mathematics, it is much more to the author's credit that he accomplishes such a fine presentation. The difficulties of discussing tensor equations when your reader has no knowledge of how they are arrived at, seem, at first, insuperable, but the author succeeds in showing the meaning of the law of gravitation and in