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CONIC SECTIONS

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AND

ANALYTICAL GEOMETRY;

THEORETICALLY AND PRACTICALLY ILLUSTRATED.

BY

HORATIO N. ROBINSON, LL. D.,

LATE PROFESSOR OF MATHEMATICS IN THE U. S. NAVY, AND AUTHOR OF A FULL COURSE  
OF MATHEMATICS.

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## P R E F A C E.

In the preparation of the following work the object has been to bring within the compass of one volume of convenient size an elementary treatise on both Conic Sections and Analytical Geometry.

In the first part, the properties of the curves known as the Conic Sections are demonstrated, principally by geometrical methods; that is, in the investigations, the curves and parts connected with them are constantly kept before the mind by their graphic representations, and we reason directly upon them.

In the purely Analytical Geometry the process is quite different. Here the geometrical magnitudes, themselves, or those having certain relations to them, are represented by algebraic symbols, and we seek to express properties and imposed conditions by means of these symbols. The mind is thus relieved, in a great measure, of the necessity of holding in view the often-times complex figures required in the intermediate steps of the first method. It is, mainly, at the beginning and end of our investigations that we have to deal with concrete quantity. That is, after we have expressed known and imposed conditions, analytically, our reasoning is independent of the kind of quantity involved, until the conclusion is reached in the form of an algebraic expression, which must then receive its geometrical interpretation.

Much of the value of Analytical Geometry, as a disciplinary study, will be derived from a careful consideration, in each case, of this process of passing from the concrete to the abstract and the

converse, and both teacher and student are earnestly recommended to give it a large share of their attention.

In both divisions of the work the object has been to present the subjects in the simplest manner possible, and hence, in the first, analytical methods have been employed in several propositions when results could be thereby much more easily obtained; and for the same reason, in the second division, a few of the demonstrations are almost entirely geometrical.

The analytical part terminates, with the exception of some examples, with the Chapter on Planes. Three others might have been added; one on the transformation of Co-ordinates in Space, another on Curves in Space, and a third on Surfaces of Revolution and curved surfaces in general: but the work, as it is, covers more ground than is generally gone over in Schools and Colleges, and is sufficiently extensive for the wants of elementary education. Numerous examples are given under the several divisions in the second part to illustrate and impress the principles.

The Author has great pleasure in acknowledging his obligations to Prof. I. F. Quinby, A. M., of the University of Rochester, N. Y., formerly Assistant Prof. of Mathematics in the United States Military Academy, at West Point, for valuable services rendered in the preparation of this treatise, as well as for the contribution to it of much that is valuable both in matter and arrangement. His thorough scholarship, as well as his long and successful experience as an instructor in the class-room, preëminently qualified him to perform such labor.

*December, 1861.*

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