A GEOMETRICAL TREATISE ON CONIC SECTIONS WITH NUMEROUS EXAMPLES FOR THE USE OF SCHOOLS AND STUDENTS IN THE UNIVERSITIES: WITH AN APPENDIX ON HARMONIC RATIO, POLES AND POLARS, AND RECIPROCATION

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A geometrical treatise on conic sections with numerous examples for the use of schools and students in the universities: with an appendix on harmonic ratio, poles and polars, and reciprocation by W. H. Drew

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W. H. DREW

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Trieste

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AN APPENDIX ON HARMONIC RATIO, POLES AND POLARS, AND RECIPROCATION.

BY THE

REV. W. H. DREW, M.A.,

ST. JOHN'S COLLEGE, CAMBRIDGE,

PROFESSOR OF MATHEMATICS IN KING'S COLLEGE, LONDON.

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PREFACE TO THE FIFTH EDITION.

In this Edition an Appendix has been added, in which an endeavour has been made to present the subject of Harmonic Ratio, Poles and Polars, and Reciprocation, in a form adapted to the wants of Students who approach these ideas for the first time.

A further collection of Problems has also been given, taken from Examination Papers of recent dates, and the work has thus been brought completely up to the requirements of the present time.

W. H. DREW.

King's College, London,
June 26, 1875.

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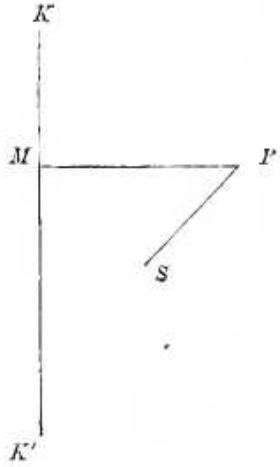
CONIC SECTIONS.

INTRODUCTION.

1. DEF. The curve traced out by a point, which moves in such a manner that its distance from a given fixed point continually bears the same ratio to its distance from a given fixed line, is called a *Conic Section*.

The fixed point is called the *Focus*, and the fixed line the *Directrix*.

Thus if S be the focus, and KK' the directrix, and P a point from which PM is drawn at right angles to the directrix, the curve traced out by P will be a *Conic Section*, provided P move in such a manner that SP always bears the same ratio to PM.



(1.) When the distance from the fixed point is equal to the distance from the fixed line, that is, when SP is equal to PM, the *Conic Section* is called a *Parabola*.

(2.) When the distance from the fixed point is less than the distance from the fixed line, that is, when the ratio which

SP bears to *PM* is less than unity, the *Conic Section* is called an *Ellipse.*

(3.) When the distance from the fixed point is greater than the distance from the fixed line, that is, when the ratio which *SP* bears to *PM* is greater than unity, the *Conic Section* is called an *Hyperbola.*

2. The reason of the term *Conic Sections* being applied to these curves is that, when a *Cone* is intersected by a plane surface, the boundary of the section so formed will, *in general,* be one or other of these curves.

I propose to investigate the properties of the *Conic Sections* from the definitions given above, and afterwards to show in what manner a *Cone* must be divided by a plane in order that the curve of intersection may be a *Parabola, Ellipse,* or *Hyperbola.*