

it possible to dispose of the question of tangents, normals and polars for the ellipse, hyperbola and parabola at one stroke.

The small number of formulæ given and of theorems proven is an excellent feature of the book, for the student should be made to look upon analytic geometry not as a mass of formulæ and theorems, but as a method by which he can deduce formulæ and theorems when he wants them. Exercises occupy, as they should, a prominent place, though we regret that such a large proportion of them are of the trivial numerical sort.

Perhaps the most important class of exercises for developing the thinking power of the student are locus problems. Exercises of this sort are not wanting; but little attention is given in the text to the methods of solving them, even the introduction of auxiliary variables and their subsequent elimination not being explicitly mentioned. This is a serious omission, which, however, can be supplied by the teacher.

The portion of the book devoted to plane analytic geometry includes a discussion of some of the more elementary properties of the ellipse, hyperbola and parabola and closes with a chapter on the general equation of the second degree.

Nearly one quarter of the book is devoted to solid analytic geometry and in this space it has been possible to give an introduction to the subject amply sufficient as a preparation for higher mathematical work. At the close the questions of the rectilinear generators and circular sections of quadric surfaces are touched upon.

In conclusion the book deserves praise not only for clearness of statement but in the main for rigor of treatment.

MAXIME BÔCHER.

NOTES.

A REGULAR meeting of the AMERICAN MATHEMATICAL SOCIETY was held in New York, on Saturday afternoon, May 29, at three o'clock. Professor F. MORLEY and later the Vice-President, Professor R. S. WOODWARD, occupied the chair. There were eight members present. The Council announced the election of the following persons to membership in the Society: Mr. WILLIAM ANTHONY GRANVILLE, Yale University, New Haven, Conn.; Dr. KURT LAVES, University of Chicago, Chicago, Ill.; Professor ANNA HEL-

ENE PALMIÉ, Western Reserve University, Cleveland, Ohio. Three nominations for membership were received. On recommendation of the Council, By-Law V was so amended that the regular meetings of the Society shall hereafter be held at half past ten o'clock, A. M., on the last Saturday of February, April and October, unless the Council shall otherwise order. The following papers were read :

(1) Professor F. MORLEY: "On the generating function of permutations when considered with reference to sequences."

(2) Dr. EMORY McCLINTOCK: "On a solution of the bi-quadratic which combines the methods of Descartes and Euler."

(3) Dr. E. O. LOVETT: "On certain classes of point transformations in the plane."

In the absence of the authors, Dr. McClintock's paper was read by Professor T. S. Fiske, Dr. Lovett's by the Secretary.

THE second conference of members of the AMERICAN MATHEMATICAL SOCIETY was held in Chicago Saturday morning, April 24, at ten o'clock. There were thirteen members present. Professor E. H. MOORE was elected temporary chairman. Under authorization by the Council, the conference proceeded to organize as a Section of the Society. The following officers were elected: Chairman, Professor E. H. MOORE; Secretary, Professor THOMAS F. HOLGATE; Programme Committee, Professor ALEXANDER ZIWET, Professor A. S. HATHAWAY, and the Secretary. The following papers were read:

(1) Dr. E. M. BLAKE: "Note upon a representation in space of the ellipses drawn by an ellipsograph."

(2) Dr. JAMES W. GLOVER: "Some properties of function defined by a certain differential equation."

(3) Professor A. S. HATHAWAY: "Orthogonal surfaces."

(4) Professor A. S. HATHAWAY: "Steady motion of fluids."

(5) Professor E. H. MOORE: "The decomposition of modular systems of rank n in n variables."

(6) Professor H. B. NEWSON: "On canonical binary forms."

(7) Professor JAMES BYRNIE SHAW: "A theory of continuity."

(8) Professor JAMES BYRNIE SHAW: "A general theorem in matrices."

(9) Professor H. S. WHITE: "On matrices, covariants and affiliants."

(10) Professor A. S. HATHAWAY: "Quaternions as four-dimensional numbers."

The next meeting of the Section will be held during the Christmas holidays, the exact date to be fixed hereafter.

At the meeting of the Council of the AMERICAN MATHEMATICAL SOCIETY, held May 29, Professor E. H. MOORE was elected Second Vice-President of the Society.

DURING the season 1897-98 the AMERICAN MATHEMATICAL SOCIETY will hold four meetings in New York, viz.: on Saturday, October 30; Wednesday, December 29; Saturday, February 26; Saturday, April 30. Each meeting will begin at half past ten o'clock in the morning and will include a morning and an afternoon session. The meeting of December 29 will be the annual meeting.

THE official report of the proceedings of the last annual meeting of the German Mathematical Society, held at Frankfurt-on-the-Main, September 21-26, 1896, gives the following list of papers read at this meeting:

(1) A. BRILL (Tübingen): "The resolution of a ternary form into linear factors."

(2) R. FRICKE (Braunschweig): "On a simple group of 360 operations."

(3) F. KLEIN (Göttingen): "On a proposition in the theory of finite (discontinuous) groups of linear substitutions of any number of variables."

(4) G. KOHN (Vienna): "On a geometric interpretation of the invariants of doubly binary forms."

(5) G. LANDSBERG (Heidelberg): "On a particular kind of space transformations."

(6) F. MEYER (Clausthal): "On full systems in trigonometry."

(7) R. HAUSSNER (Würzburg): "On Goldbach's law."

(8) L. HEFFTER (Giessen): "On adjoining configurations (Nachbarconfigurationen), triple systems, and metacyclic groups."

(9) M. NOETHER (Erlangen): "Continuous groups of Cremona transformations."

(10) F. ROGEL (Barmen): "On the multiplicity of values of trigonometric expansions within certain limits."

(11) H. SCHAPIRA (Heidelberg): "On a *cribrum algebraicum*, or the cofunctional generation of prime numbers."

(12) F. SCHILLING (Aachen): "On circular-arc-triangles with simple node."

(13) A. SCHOENFLIES (Göttingen): "Transfinite numbers, the axiom of Archimedes, and projective geometry."

- (14) E. STUDY (Bonn): "The problem of Apollonius."
- (15) E. SCHRÖDER (Karlsruhe): "On some of G. Cantor's theorems."
- (16) J. HAGEN (Washington): "Report on a new bibliography of the works of Leonhard Euler."
- (17) K. ROHN (Dresden): "Determination of the number of constants for tortuous curves."
- (18) E. STEINITZ: "Homogeneous congruences."
- (19) J. FRANZ (Königsberg): "Linear differential equations with an absolute term."
- (20) F. KLEIN (Göttingen): "On the analytic representation of rotations in the problems of mechanics."
- (21) L. HENNEBERG (Darmstadt): "On hydrostatics."
- (22) F. MEYER (Clausthal): "On force effects in triple engines."
- (23) B. SCHWALBE (Berlin): "On the preparation required of teachers of mathematics and natural science in higher educational institutions, according to the demands of the present day."
- (24) W. DYCK (Munich): "On the resolutions adopted by the international catalogue conference in London, July, 1896."
- (25) K. HEUN (Berlin): "On the mathematical and mechanical principles in their application to technical problems."
- (26) F. S. ARCHENHOLD (Berlin): "Photographs of the large telescope (70 cm. aperture, 21 m. focal length) of the Treptow Observatory."
- (27) H. BURKHARDT (Göttingen): "On vector analysis."
- (28) ISRAEL-HOLTZWART (Frankfort): "Proposition for extending the intuitive methods of mathematical representation."
- (29) F. HÖFFLER (Zürich): "On a method for determining simultaneously the velocity of light and the velocity of the solar system in space."
- (30) G. MIE (Karlsruhe): "On the transmission of energy in the electro-magnetic field."
- (31) W. A. NIPPOLDT (Frankfort): "Propositions for improving the isochronism of pendulums of clocks by various simple compensations."
- (32) O. RAUSENBERGER (Frankfort): "The discontinuities of fluid motion."
- (33) J. R. SCHÜTZ (Göttingen): "Solution of the boundary problem (Randwertaufgabe) for the diffraction of Röntgen rays."
- (34) E. WIECHERT (Königsberg): "On the distribution of mass in the interior of the earth."

(35) H. WIENER (Darmstadt): Exhibition of models in the mathematical museum of the Technical School at Darmstadt.

As this meeting of the German Mathematical Society was held, as customary, in connection with the meeting of the German Association of Physicians and Naturalists, the last thirteen of the above-named papers were read at joint sessions arranged with the sections of this Association for physics, for theory of instruments, and for the teaching of mathematics and natural science. The publication of the annual volume (Jahresbericht) of the Society has passed from G. Reimer, of Berlin, to B. G. Teubner, of Leipsic. The fifth volume, which is in preparation, will contain in full the papers of Dr. Schwalbe (23) and Professor Burkhardt (27), as well as abstracts of the other papers.

As regards the publication of more extensive reports on special mathematical subjects, it is announced that, while Professor Hilbert's Report on the theory of algebraic corpora has been published in the fourth annual volume, a report on the theory of numbers by Professor Minkowski will appear in a future volume. Professor E. Czuber, of Vienna, promises a report on the calculus of probabilities for the next annual meeting which will take place at Braunschweig, in September, 1897; Professor P. Stäckel hopes to complete his report on differential geometry within two years. There are also in preparation a report on line geometry, by Professor Wälsh, one on infinite series, by Professor Fringsheim, and one by Professor Mehmke, on graphical methods.

Instead of the mathematical dictionary discussed at previous meetings, it has been decided to publish an Encyclopædia of the Mathematical Sciences; Professors Meyer (Clausthal) and Burkhardt (Zürich) are the editors; B. G. Teubner is the publisher. For the year 1897, the executive committee elected Professor Felix Klein President, Dr. A. Gutzmer (Halle a. S.) Secretary and Treasurer, and appointed Professor A. Wangerin and Dr. Gutzmer a committee to publish the annual volume. The number of members at present is 291.

CAMBRIDGE UNIVERSITY. The lectures on Higher Mathematics to be delivered during the ensuing year include the following subjects:—in *Michaelmas Term*, 1897: Professor STOKES: Connection between certain ascending convergent and descending semi-convergent series.—Professor FORSYTH: Invariants and covariants; Calculus of variations.—Professor

Sir R. S. BALL: Planetary theory.—Dr. HOBSON: Spherical and cylindrical harmonics.—Mr. BAKER: Solid geometry.—Dr. LACHLAN: Projective geometry.—Mr. BERRY: Theory of functions. *Lent Term*, 1898: Professor FORSYTH: Invariants and covariants (ternary forms).—Professor DARWIN; Lunar theory (Hill's method).—Professor BALL: Non-Euclidean geometry.—Mr. PENDLEBURY: Theory of numbers.—Mr. GLAZEBROOK: Sound.—Dr. HOBSON: Higher dynamics.—Mr. BAKER: Abelian functions.—Dr. GLAISHER: Elliptic functions.—Mr. HERMAN: Hydrodynamics.—Mr. BENNETT: Linear and quadratic complexes. *Long Vacation*, 1897 and 1898: Professor DARWIN: Figure of earth and precession; Potential and attractions.

THE UNIVERSITY OF CHICAGO. The mathematical courses to be offered during the summer quarter of 1897 have already been announced in the BULLETIN (p. 293).

During the three quarters (a, w, s) of the academic year 1897-98 the following advanced mathematical courses (four or five hours weekly) will be offered: By Professor MOORE: Seminar devoted to research work, especially in groups, algebra and arithmetic (w, s); Theory of substitutions (a); Theory of numbers (a); General arithmetic (w, s).—By Professor BOLZA: Theory of invariants ($a, \frac{1}{2}w$); Calculus of variations ($\frac{1}{2}w$); Advanced integral calculus (a, w).—By Associate Professor MASCHKE: Differential geometry (w, s); Functions of a complex variable (w); Linear differential equations (s).—By Dr. HANCOCK: Theory of equations (a, w).—By Dr. LAVES: Analytic mechanics (a, w). The Mathematical Club meets fortnightly.

COLUMBIA UNIVERSITY. During the academic year 1897-98 the following advanced courses will be given by the Department of Mathematics, each course occupying three hours a week: By Professor FISKE: (1) Special topics in differential and integral calculus, first half year; (2) Differential equations with applications, second half year; (3) General theory of functions of a complex variable, first half year; (4) Elliptic functions, second half year.—By Professor COLE: (5) Groups of linear transformations and the theory of the equation of the fifth degree, both half years; (6) Theory of substitutions, both half years.—By Mr. MACLAY: (7) Analytical theory of curves of double curvature and curved surfaces, both half years.—By Dr. CHITTENDEN: (8) Theory of invariants, first half year; (9) Higher plane curves, second half year.

The advanced courses to be given by the Department of

Mechanics are the following: By Professor WOODWARD: (1) Theory of the potential function, with applications to gravitation, hydromechanics, geodynamics, static electricity and terrestrial magnetism, two hours per week throughout the year; (2) Advanced analytical mechanics, embracing the general principles of kinematics, statics and kinetics, with applications of the methods of Lagrange, Hamilton and Jacobi to the interpretation of mechanical phenomena, two hours per week throughout the year.—By Professor PUPIN: (3) General electromagnetic theory, two hours per week throughout the year; (4) Electromagnetic theory of light, three hours per week, second half year.—By Mr. J. C. PFISTER: (5) Theoretical mechanics, two hours per week throughout the year; (6) Elementary thermodynamics and hydromechanics; thermodynamics (based on Maxwell's Theory of Heat), two hours per week, first half year; hydromechanics, two hours per week, second half year.

MR. G. H. HINTON, for the past four years instructor in mathematics at Princeton University, has accepted a call to be assistant professor of mathematics at the University of Minnesota.

THE vacancy among the corresponding members of the Paris Academy of Sciences, caused by the death of Professor SYLVESTER, has been filled by the election of Professor FELIX KLEIN.

THE officers of Section A (mathematical and physical science) for the Toronto meeting of the British Association for the Advancement of Science are: *President*, Professor A. R. FORSYTH; *Vice-Presidents*, R. T. GLAZEBROOK, Professor A. JOHNSON, Professor O. J. LODGE; *Secretaries*, J. C. GLASHAN, Professor W. H. HEATON; *Recorders*, J. L. HOWARD, Professor J. G. MCGREGOR.

DR. FRANZ MEYER, docent in mathematics in the School of Mines at Clausthal, has been called to the University of Königsberg.