NOTES.

THE concluding (July) number of volume 12 of the *Annals of Mathematics* contains the following papers: "The harmonics of a stretched string vibrating in a resisting medium," by C. R. DINES; "The mixing effect of surface waves," by C. S. SLICHTER; "Characteristics of two partial differential equations of order one," by C. A. NOBLE; "The differential equation of the third order with a quadratic equation between the integrals," by S. EPSTEEN; "Relations among some cyclotomic numbers," by T. HAYASHI.

THE eighty-first annual meeting of the British association for the advancement of science was held at Portsmouth, England, August 30 to September 6, under the presidency of Sir William Ramsey. Professor H. H. TURNER was chairman of section A, mathematics and physics.

THE fortieth annual meeting of the French association was held at Dijon, July 31 to August 5, with Inspector Ch. Lallemand as president. E. BELOT was chairman of the mathematical section.

THE fifth annual meeting of the Italian association will be held at Rome, October 12 to 18; Professor G. Ciamician is president, and Professor G. CASTELNUOVO chairman of section A.

THE second congress of Scandinavian mathematicians was held at Copenhagen, August 28–31.

THE organizing committee of the Fifth international congress of mathematicians, to be held at Cambridge, England, August 22–28, 1912, has issued a circular containing the names of the 46 members of the international committee and giving the following items of information:

"Special arrangements will be made for the consideration of the reports of the international committee appointed at the congress in Rome to enquire into the teaching of mathematics.

The committee has commenced to organize a series of lectures which shall give some idea of the present state and progress of the principal branches of mathematics, including its applications. The speakers already chosen are E. BOREL, E. W. BROWN, A. KNESER, E. G. H. LANDAU, Sir J. LARMOR, and Sir W. WHITE.

Their subjects will be announced later. The congress will be divided into four sections: I, arithmetic, algebra, analysis; II, geometry; III, applications; IV, philosophical questions.''

AMONG the prizes awarded by the Paris academy of sciences at the close of the second semester, the following were for achievements in pure and applied mathematics: The Lalande prize (fr. 540) to Dr. Lewis BOSS, of the Albany Observatory; the Pontécoulant prize (fr. 700) to Dr. L. SCHULOF, for his theory of comets and the completion of the lunar tables; the Francoeur prize (fr. 1000) to E. LEMOINE for his work in geometry; the Poncelet prize (fr. 2000) to M. RATEAU for progress in mechanics; the Montyon prize (fr. 700) to M. JOUGUET, for his work in thermodynamics. A general prize of fr. 10,000 was awarded to the estate of the late Professor J. TANNERY for his work on the theory of functions and particularly for his services as secretary to the Ecole Normale.

THE section of physics and mathematics of the royal society of Naples announces the following prize problem:

''A new contribution to the theory of differential forms of general order and degree.''

Competing memoirs should be written in Italian, French or Latin, and sent to the secretary of the academy before June 30, 1912. The prize is 500 lire.

FROM the Dr. Elsa Neumann foundation the University of Berlin will award a prize of 1000 marks to the author of the most meritorious contribution in mathematics or physics submitted to the philosophical faculty of the university during the year 1911. The award will be made February 18, 1912.

THE Provisional Report of the national committee of fifteen on a geometry syllabus, has now been issued in pamphlet form. It is a reprint of the partial reports published in *School Science and Mathematics*, during April, May, and June, 1911, and was submitted in its present form to the National educational association at its San Francisco meeting, July 8–14, 1911. The report contains a historical introduction of 25 pages prepared by Professor F. Cajori; a section on logical considerations including axioms, definitions, treatment of limits, time and place in the curriculum, purpose of the study of geometry; a section on the grading and distribution of exercises; a section on types

of courses for special classes of students and on preliminary inductive courses in the grades; and finally the syllabus itself, exhibiting by means of different forms of type the varying degrees of emphasis which may properly be attached to the various theorems.

AT the meeting of the International commission on the teaching of mathematics held at Milan, Italy, September 18–21, 1911, the central committee received reports of the various national sub-committees and formulated plans regarding the submission of the final report to the Fifth international congress of mathematicians to be held at Cambridge, England, next August. From the reports of the various sub-committees the following questions were discussed at length:

A. To what extent can the systematic presentation of mathematics in the advanced schools (colleges, lycées, Gymnasien, Realschulen, $\cdots$) be taken account of? Is it wise to emphasize the fusion of different branches in such instruction?

B. What is the proper instruction in mathematics both pure and practical, for students of physics and the natural sciences?

THE annual list of American doctorates published in *Science* presents for the academic year 1910–1911, 437 names, of which 239 are credited to the sciences. The following 26 successful candidates offered mathematics as major subject (the titles of the theses are appended): H. L. AGARD, Yale, "The extension of some theorems in the theory of sets of points in n-dimensional space"; T. B. ASHCRAFT, Johns Hopkins, "Quadratic involutions on the plane rational quartic"; Miss C. L. BACON, Johns Hopkins, "The Cartesian oval and the elliptic functions"; R. P. BAKER, Chicago, "The problem of the angle bisectors"; Miss I. BARNEY, Yale, "Line and surface integrals"; W. H. BATES, Chicago, "An application of symbolic methods to the treatment of mean curvature in hyperspace"; F. W. BEAL, Princeton, "Associated normal congruences"; Miss A. D. BIDDLE, California, "Constructive theory of the unicursal plane quartic by synthetic methods"; P. P. BOYD, Cornell, "On the perspective Jonquières involutions associated with the (2, 1) ternary correspondence"; D. BUCHANAN, Chicago, "A class of periodic solutions of the problem of three bodies, two of equal mass, the third moving on a straight line"; B. H. CAMP, Yale, "The convergence of singular integrals"; R. D. CARMICHAEL, Princeton, "Linear difference equations and their analytic solu-

tions"; J. L. JONES, Yale, "Number concept"; S. LEFSCHETZ, Clark, "On the existence of loci with given singularities"; L. LINDSAY, Syracuse, "The minors of a compound determinant"; W. R. MARRIOTT, Pennsylvania, "The determination of the order of the groups of isomorphisms of the groups of order p^4, where p is a prime"; W. O. MENDENHALL, Michigan, "On the characteristic properties of sum formulas in the theory of divergent series"; W. J. MONTGOMERY, Clark, "Singularities of twisted quintic curves"; L. O'SHAUGHNESSY, Pennsylvania, "The integrability of the differential equation representing the sum of a family of series"; A. D. PITCHER, Chicago, "The interrelations of eight fundamental properties of classes of functions"; H. W. REDDICK, Columbia, "Systems of tautochrones in a general field of force"; E. B. STOUFFER, Illinois, "Invariants of linear differential equations with applications to projective differential geometry"; S. E. URNER, Harvard, "Certain singularities of point transformations in space of three dimensions"; Miss W. P. WEBBER, Cincinnati, "On the construction of doubly periodic functions which have singular points (polar and essential) in the period parallelogram"; Miss M. B. WHITE, Chicago, "The dependence of the focal point on curvature in space problems of the calculus of variations"; W. A. WILSON, Yale, "Theory of point aggregates applied to Lebesgue integrals."

HARVARD UNIVERSITY.—During the academic year 1911–12 Professor G. A. Bliss of the University of Chicago will spend the months October to December, and Professor Max Mason of the University of Wisconsin the months February to June as Lecturers in Mathematics at Harvard. Besides taking part in more elementary instruction, they will give the following advanced courses: Professor BLISS: Differential geometry of curves and surfaces, three hours; Partial differential equations, three hours. Professor MASON: Dynamics of rigid and elastic bodies, three hours; The electron and the electro-magnetic field, three hours.

The following advanced courses are also announced:

By Professor W. E. BYERLY: Introduction to modern geometry and modern algebra, three hours; Trigonometric series, introduction to spherical harmonics, the potential function, three hours with Professor B. O. PEIRCE.—By Professor B. O. PEIRCE: Hydromechanics, two hours, first half-year.—By Professor W. F. OSGOOD: Advanced calculus, three hours; Theory

of functions, three hours.—By Professor M. BÔCHER: Vector analysis, three hours, first half-year; Finite differences and difference equations, three hours, second half-year.—By Professor C. L. BOUTON: The elementary theory of differential equations, three hours, first half-year; Differential equations and Lie's theory, three hours.—By Professor J. L. COOLIDGE: Probability, three hours; Line geometry, three hours.—By Dr. D. JACKSON: Infinite series and products, three hours, first half-year; Advanced algebra, three hours, second half-year; The theory of numbers including the theory of ideals, three hours.

THE following advanced courses in mathematics are offered at the Italian universities during the academic year 1911–1912. Courses in algebra, analytic geometry, projective and descriptive geometry, and elementary courses in the calculus, mechanics, astronomy, and geodesy are not included:

UNIVERSITY OF BOLOGNA: By Professor C. ARZELÀ: Higher mathematics, three hours.—By Professor P. BURGATTI: Dynamics of rigid bodies with application to planetary motion, equilibrium of a rotating fluid mass, three hours.—By Professor L. DONATI: Account of the different electromagnetic theories and of the principle of relativity, three hours.—By Professor S. PINCHERLE: Theory of analytic functions, linear differential equations, three hours.—By Professor U. SCARPIS: Operation groups and their application to the theory of numbers, three hours.

UNIVERSITY OF CATANIA.—By Professor M. DE FRANCHIS: Geometry on algebraic curves and surfaces, hyperelliptic surfaces, four hours.—By Professor G. PENNACCHIETTI: Dynamics of rigid bodies, mechanics of deformable media, four hours.—By Professor C. SEVERINI: Integral equations and their applications to analysis, four hours.—By ———: Mathematical physics, four hours.

UNIVERSITY OF GENOA.—By Professor E. E. LEVI: Elementary theory of functions of one and more complex variables, problem of uniformization of polydromic functions, four hours.—By Professor G. LORIA: Algebraic and transcendental curves and surfaces, three hours.—By Professor O. TEDONE: Integration methods of Riemann-Volterra, application to boundary problems, three hours.

UNIVERSITY OF NAPLES.—By Professor F. AMODEO: History of mathematics during the middle ages (XIII to XVI century), three hours.—By Professor A. DEL RE: Grassmann's analysis in n-dimensions with application to geometry and mechanics in spaces of constant curvature, four and one-half hours.—By Professor R. MARCOLONGO: Application of vector-homographics to hydrodynamics, three hours.—By Professor D. MONTESANO: General theory of algebraic surfaces, surfaces of the third and fourth order, four and one-half hours.—By Professor E. PASCAL: Selected chapters of advanced analysis, three hours.—By Professor E. PINTO: Electrostatics, four and one-half hours.—By Professor G. TORELLI: Analytic theory of numbers (advanced part), three hours.

UNIVERSITY OF PADUA.—By Professor F. D'ARCAIS: General theory of functions, elliptic functions, four hours.—By Professor U. CISOTTI: Mathematical theory of elasticity with technical applications, three hours.—By Professor P. GAZZANIGA: Theory of numbers, three hours.—By Professor T. LEVI-CIVITA: Waves in their different meanings, four and one-half hours.—By Professor G. RICCI: Absolute differential calculus with applications, four hours.—By Professor F. SEVERI: Theory of algebraic functions of two variables and of their integrals (advanced part), four hours.—By Professor G. VERONESE: Foundations of geometry (advanced part), four hours.

UNIVERSITY OF PALERMO.—By Professor G. BAGNERA: General theory of analytic functions, algebraic functions of one variable, three hours.—By Professor M. GEBBIA: Elasticity, wave theory of light, four and one-half hours.—By Professor G. B. GUCCIA: General theory of algebraic curves and surfaces, four and one-half hours.—By Professor A. VENTURI: Figure of planets and especially of the Earth, Pratt's, Stoke's, Helmert's theories, shell-tides, gravity, three hours.

UNIVERSITY OF PAVIA.—By Professor L. BERZOLARI: Birational transformations in the plane and in space, three hours.—By Professor F. GERBALDI: Functions of a complex variable, elliptic functions, three hours.—By Professor G. VIVANTI: Calculus of variations, integral equations, three hours.—By ———: Mathematical physics, three hours.

UNIVERSITY OF PISA.—By Professor E. BERTINI: Geometry

on an algebraic surface (advanced part), three hours.—By Professor L. BIANCHI: Arithmetic theory of quadratic (binary and ternary) forms, principles of analytic arithmetic, arithmetic of algebraic fields, four and one-half hours.—By Professor U. DINI: Spherical and Bessel's functions, four and one-half hours.—By Professor G. A. MAGGI: Equilibrium and motion of elastic bodies, application to optics, four and one-half hours.—By Professor P. PIZZETTI: Spherical astronomy, determination of planetary orbits, precession, nutation, theory of the tides, four and one-half hours.

UNIVERSITY OF ROME.—By Professor G. BISCONCINI: Elementary differential properties of curves and surfaces, three hours.—By Professor G. CASTELNUOVO: Differential geometry, three hours.—By Professor G. LAURICELLA: Boundary problems, three hours.—By Professor L. ORLANDO: Mathematical and physical grounds of aerial navigation, three hours.—By Professor L. SILBERSTEIN: Principles of thermodynamics, electromagnetics and optics, mechanics according to the principle of relativity, three hours.—By Professor V. VOLTERRA: Optics, three hours; application of mechanics to geophysical questions, three hours.

UNIVERSITY OF TURIN.—By Professor T. BOGGIO: Equilibrium of a rotating fluid mass, three hours.—By Professor G. FUBINI: Theory of partial differential equations in both the real and the complex field, Cauchy's and boundary problems, three hours.—By Professor G. SANNIA: Geometrical applications of the theory of algebraic forms, one hour.—By Professor C. SEGRE: Continuous groups of transformations, three hours.—By Professor C. SOMIGLIANA: Propagation of heat, thermodynamics, three hours.

PROFESSOR L. FEJÉR, of the University of Klausenburg, has accepted a professorship of mathematics at the University of Budapest.

DR. M. HENNEQUIN has been appointed director of mathematical conferences of the University of Caen.

DR. M. PLANCHEREL, of the University of Geneva, has been appointed associate professor of mathematics at the University of Freiburg, Switzerland.

DR. W. LÁSKA, of the technical school at Lemberg, has been appointed professor of mathematics at the Bohemian University of Prague.

PROFESSOR E. SCHMIDT, of the University of Erlangen, has accepted a professorship of mathematics at the University of Breslau.

PROFESSOR G. CANTOR, of the University of Halle, has been elected a corresponding member of the royal institute of Venice.

DR. F. ZORETTI has been appointed professor of rational mechanics at the University of Caen.

PROFESSOR L. ISELY, of the Swiss University at Neuchâtel, has retired from active teaching.

PROFESSOR F. D'ARCAIS, of the University of Padua, has been elected to membership in the royal institute of Venice.

THE royal academy of sciences of Naples has recently elected Professor D. MONTESANO resident member, Professor U. DINI, of the University of Pisa, non-resident member, and Professor G. GUCCIA, of the University of Palermo, corresponding member.

PROFESSOR R. DEDEKIND, of the technical school at Brunswick, and Professor Sir J. LARMOR, of the University of Cambridge, have been elected foreign members of the royal academy dei Lincei, of Rome; Professor O. TEDONE, of the University of Genoa, has been elected to corresponding membership.

PROFESSOR T. LEVI-CIVITA, of the University of Padua, has been elected corresponding member of the academy of sciences of Paris.

THE honorary degree of doctor of science has been conferred by Colgate University upon Professor H. E. SLAUGHT, of the University of Chicago.

PROFESSOR L. G. WELD, of the University of Iowa, has resigned. Professor A. G. SMITH succeeds Professor Weld as head of the department of mathematics.

AT Dartmouth College, Professor A. D. PITCHER, of the University of Kansas has been appointed assistant professor of mathematics; Mr. MEYER GABA, of the Rolla School of

Mines, and Mr. C. R. DINES, of Harvard University, have been appointed instructors in mathematics.

AT the University of Kansas, Professor J. N. VAN DER VRIES has been elected chairman of the department of mathematics; Dr. H. N. JORDAN has been appointed assistant professor of mathematics; Miss HAZEL MCGREGOR, Mr. J. J. WHEELER, and Mr. J. O. HASSLER have been appointed instructors in mathematics.

DR. H. E. BUCHANAN, of the University of Wisconsin, has accepted the professorship of mathematics at Carleton College, Northfield, Minnesota.

MR. W. E. SMITH has been appointed assistant professor of mathematics at the Pennsylvania State College.

DR. D. BUCHANAN has been appointed assistant professor of mathematics at Queen's College, Kingston, Ontario.

REV. A. S. HAWKESWORTH has resigned his lectureship in higher mathematics and semitic languages in the University of Pittsburgh.

DR. H. W. MOTT has been appointed assistant professor of mathematics at the University of Wisconsin.

DR. R. L. MOORE, of Northwestern University, has been appointed instructor in mathematics at the University of Pennsylvania.

MR. E. P. R. DUVAL has been appointed instructor in mathematics at Princeton University.

AT Middlebury College Mr. G. H. CRESSE has been appointed head of the department of mathematics with the rank of assistant professor.

MR. W. C. KRATHWOHL has been appointed instructor in mathematics in Washington University, St. Louis.

DR. J. E. ROWE will have charge of mathematical work at Haverford College during the sabbatical absence of Professor L. W. Reid.

DR. G. D. GABLE, professor of mathematics at Wooster University, died August 23 at the age of forty-eight. Professor Gable had been a member of the American Mathematical Society since 1892.