These ideas are not new; but the author has sought to make a systematic use of them in developing a theory of number sequences. Two such fundamental number sequences are considered, each of which is a generalization of a sequence of binomial coefficients. Several important sets of numbers can be expressed in terms of these fundamental sequences, as for instance the set of figurate numbers in which the rth term of the nth row equals the sum of the first r terms of the $(n-1)$th row, the first row being 1, 0, 0, $\cdots$. A general theory of the two fundamental sequences is developed and the results are applied to several questions in number theory; as, for instance, the solution of congruences and diophantine equations. The methods employed are such that they cannot be explained briefly.

R. D. CARMICHAEL.

NOTES.

BEGINNING with volume 20 (1913), the *American Mathematical Monthly* will be in charge of an editorial board composed of representatives of nine supporting institutions, together with Professor B. F. FINKEL, the founder of the journal and editor since its inception in 1894. The contributing institutions are Colorado College and the Universities of Chicago, Illinois, Missouri, Minnesota, Nebraska, Kansas, Indiana, and Iowa. The editorial representatives are Professors FLORIAN CAJORI, H. E. SLAUGHT, G. A. MILLER, E. R. HEDRICK, W. H. BUSSEY, W. C. BRENKE, C. H. ASHTON, R. D. CARMICHAEL, and R. P. BAKER. The managing editor is Professor Slaught.

It will be the editorial policy of the *Monthly* to make a strong appeal to the great body of teachers in the collegiate and advanced secondary fields, not only directing attention to questions of improvement in teaching but also fostering the development of the scientific spirit among large numbers who are not now reached by the more highly technical journals. The publication of original papers will be continued, but greater attention than heretofore will be given to pedagogical and historical questions of interest and value to teachers of collegiate mathematics. An index of volumes 1–19 will soon be issued.

THE annual meeting of the London mathematical society was held on November 14, 1912. The following papers were presented: By H. F. BAKER, presidential address, "Recent advances in the theory of surfaces"; by A. B. GRIEVE, "Some properties of cubic surfaces"; by W. H. YOUNG, "The determination of the summability of a function by means of its Fourier constants"; by W. BURNSIDE, "Groups of linear substitutions of finite order which possess quadratic invariants"; by J. B. HOLT, "The irreducibility of Legendre's polynomials"; by E. W. HOBSON, "The representation of a summable function by means of a series of finite polynomials"; by E. CUNNINGHAM, "The theory of functions of real vectors."

Professor A. E. H. LOVE was chosen president of the society for the coming year.

AT the meeting of the Edinburgh mathematical society on November 8 the following papers were read: By H. S. CARSLAW, "Integral equations and the determination of Green's function in the theory of potential"; by F. E. EDWARDS, "On a certain infinite expansion"; by Mr. SWAMINARAYAN, "A determinantal proof of Ptolemy's theorem."

THE third annual meeting of the Schweizerische Mathematische Gesellschaft was held at Altdorf during the week beginning September 10, 1912, under the presidency of Professor R. VON FUETER and in affiliation with the annual meeting of the Swiss association of science. Professor H. FEHR was chosen president for the ensuing year. The following papers were presented at the meeting: "Ueber die Einteilung der Idealklassen in Geschlechter," by R. VON FUETER; "Ueber Ponceletsche Polygone," by — BÜTZBERGER; "Projektiver Beweis der absoluten Parallelkonstruktion von Lobatschefskij," by M. GROSSMANN; "Sur quelques problèmes concernant le jeu de trente et quarante," by D. MIRIMANOFF; "Ueber Gruppen algebraischer Funktionen," by O. SPIESS; "Sur les singularités des surfaces," by G. DUMAS; "Unicité du développement d'une fonction en série de polynômes de Legendre et expression analytique des coefficients de ce développement," by M. PLANCHEREL; "Nouveaux modèles de mouvement pour l'enseignement de la géométrie," by J. ANDRADE; "Kinematische Untersuchung," by E. MEISSNER; "Ueber eine besondere konforme rationale Transformation

in der Ebene," by A. EMCH; "Continuité et discontinuité" and "Sur le mouvement le plus général d'un fluid dans l'espace," by R. DE SAUSSURE; "Der Stand der Herausgabe der Werke Leonhard Eulers," by F. RUDIO; "L'état des travaux de la commission internationale de l'enseignement mathématique et de la sous-commission suisse," by H. FEHR.

THE firm of Martin Schilling in Leipzig has announced two new series of models: one is a combined gyroscope and pendulum, and the other consists of three cardboard models of the Bessel functions with complex argument.

THE Carnegie Institution of Washingon, of Washington, D. C., announces the following books in press: H. W. STAGER, "A Sylow factor table for the first twelve thousand numbers, giving the possible number of subgroups under Sylow's theorem of a group of given order between the limits of 0 and 12,000"; D. N. LEHMER, "Tables giving a complete list of the prime numbers between the limits 1 and 10,006,721."

THE following list, compiled from the "Jahres-Verzeichnis der an den Deutschen Universitäten erschienenen Schriften," volume 26, comprises the list of successful candidates for doctorates in mathematics in the German universities for the academic year 1910–11. The list is incomplete in omitting the names of candidates whose dissertations were unpublished before the volume appeared, early in 1912. The title of the dissertation, number of pages, date of publication, and name of the chairman of the examining committee are added.

Berlin.

MÜNTZ, CH.: "Zum Randwertproblem der partiellen Differentialgleichung der Minimalflächen." 34 pp. Oct. 1, 1910. Schwarz.

REMAK, R.: "Ueber die Zerlegung der endlichen Gruppen in direkte unzerlegbare Faktoren." 20 pp. Feb. 25, 1911. Frobenius, Schwarz.

STEINBACHER, F.: "Abelsche Körper als Kreisteilungskörper." 16 pp. Dec. 14, 1910. Frobenius, Schwarz.

Bonn.

BRÜES, M.: "Zur Theorie der desmischen Flächen vierter Ordnung." v + 48 pp. Nov. 23, 1910. Study.

Breslau.

KOBER, H.: "Konjugierte kinetische Brennpunkte." 77 pp. Nov. 23, 1910. Kneser.

Freiburg.

MONTFORT, P.: "Die Auflösung der numerischen Gleichungen nach Fourier." 81 pp. 1911. Lüroth.

Giessen.

CHAMBRÉ, A.: "Darstellung von Faktoren ganzer Funktionen durch Kovarianten." 36 pp. Nov. 7, 1910. Pasch.

DRESCHER, E.: "Ueber geometrische Darstellung von Gruppen." 22 pp. Feb. 6, 1911. Netto.

SCHREITER, FR.: "Ueber das kombinatorische Produkt von vier Kollineationen im Raum und die Apolarität kollinearer Verwandschaften auf allen Stufen." 60 pp. April 12, 1911. Pasch.

SEEMAN, H.: "Projektive Verallgemeinerung metrischer Begriffe." 24 pp. Sept. 21, 1910. Pasch.

THAER, FR.: "Analytische Beiträge zur Lehre vom Kegelschnittsystem ($3p$, $1l$)." 28 pp. April 15, 1911. Pasch.

VAERTING, MARIE: "Zur Transformation der vielfachen Integrale." 35 pp. Oct. 22, 1910. Pasch.

WOLFF, G.: "Ueber Kollineationen in der Ebene." 60 pp. Sept. 21, 1910. Pasch.

Göttingen.

BEHRENS, W.: "Ein der Theorie der Laval-Turbine entnommenes mechanisches Problem, behandelt mit der Himmelsmechanik." 58 pp. May 10, 1911. Klein.

FUNK, P.: "Ueber Flächen mit lauter geschlossenen geodätischen Linien." 22 pp. Aug. 1, 1911. Hilbert.

GRELLING, K.: "Die Axiome der Arithmetik mit besonderer Berücksichtigung der Beziehungen zur Mengenlehre." 26 pp. Nov. 29, 1910. Hilbert.

HECKE, E.: "Zur Theorie der Modulfunktionen von zwei Variabeln und ihrer Anwendung auf die Zahlentheorie." 37 pp. Nov. 15, 1910. Hilbert.

HIEMENZ, K.: "Die Grenzschicht an einem in der gleichförmigen Flüssigkeitsstrom eingetauchten geraden Kreiszylinder." 21 pp. Aug. 5, 1911. Prandtl.

HURWITZ, W. A.: "Randwertaufgaben bei Systemen von linearen partiellen Differentialgleichungen erster Ordnung." 97 pp. Oct. 30, 1910. Hilbert.

MÜHLENDYCK, O.: "Klassification der regelmässigsymmetrischen Flächen fünfter Ordnung." iv + 60 pp. March 30, 1911. Hilbert.

REINSTEIN, E.: "Untersuchung über die Transversalschwingungen der gleichförmig gespannten elliptisch oder kreisförmig begrenzten Vollmembran und Kreisringmembran, sowie von Vollkreis- und Kreisringmembranen mit nach speziellen Gesetzen variierter ungleichförmiger Spannung." 133 pp. May 8, 1911. Voigt.

STEINHAUS, H.: "Neue Anwendungen des Dirichlet'schen Prinzips." 45 pp. Aug. 7, 1911. Hilbert.

WIENER, FR. W.: "Elementare Beiträge zur neueren Funktionentheorie." 40 pp. Aug. 4, 1911. Landau.

Halle.

BARUCH, A.: "Ueber die Differentialrelationen zwischen den Thetafunktionen eines Arguments." 34 pp. Sept. 26, 1910. Cantor.

BECKER, K.: "Körper grösster Anziehung auf ein und zwei Ellipsoide von n Dimensionen." vi + 55 pp. Nov. 10, 1910. Gutzmer.

BOELK, P.: "Darstellung und Prüfung der Merkurtheorie des Claudius Ptolemaeus." 40 pp. Feb. 22, 1911. Wangerin.

JÜTHE, O.: "Die Schmiegungskugel einer Flächenkurve." 42 pp. Sept. 8, 1910. Wangerin.

LÜDERS, O.: "Ueber orthogonale Invarianten der bizirkularen Kurven vierter Ordnung." 58 pp. Sept. 12, 1910. Gutzmer.

Heidelberg.

PERSON, K.: "Die invarianten Gebilde erster Ordnung bei projektiven Transformationen der Ebene und des Raumes mit Anwendung auf die Klassifikation der eingliedrigen projektiven Gruppen der Ebene und des Raumes." 45 pp. Aug. 3, 1911. Königsberger.

WITTSACK, P.: "Ueber das identische Verschwinden der

Hauptgleichungen der Variation vielfacher Integrale." 30 pp. Jan. 13, 1911. Königsberger.

Jena.

FENDER, W.: "Zur Theorie von verallgemeinerten Bernoullischen und Eulerschen Zahlen." 58 pp. July 4, 1911. Haussner.

Königsberg.

MERTENS, P.: "Ueber gewisse räumliche Punktmengen, die sich als stetige Flächen auffassen lassen." 86 pp. Oct. 17, 1910. Schoenflies, Meyer.

Leipzig.

MÜLLER, W.: "Die rationale Kurve fünfter Ordnung im fünf-, vier-, drei- und zweidimensionalen Raum." 100 pp. Jan. 20, 1911. Rohn, Hölder.

PICKERT, E.: "Verallgemeinerung der Untersuchungen von Gauss über das arithmetisch-geometrische Mittel." 67 pp. May 30, 1911. Hölder, Rohn.

ROSENHAUER, K.: "Die oscillatorische Bewegung einer Kreisscheibe im Innern einer festen Cylinderfläche." 46 pp. Jan. 19, 1911. Neumann, Rohn.

Marburg.

SCHWANTKE, C.: "Ueber den axiomatischen Aufbau einer Geometrie linearer Kugelsysteme." 42 pp. Sept. 19, 1910. Hensel.

Münster.

JOACHIMI, O.: "Ueber Kurven, bei denen die beiden Krümmungen durch eine quadratische Beziehung verknüpft sind." 57 pp. March 16, 1911. von Lilienthal.

KEISKER, L.: "Beiträge zu den Anwendungen der Theorie der unendlich kleinen Schraubungen auf Raumkurven." 44 pp. Oct. 15, 1910. von Lilienthal.

KRAFT, K.: "Das Normalenproblem an Kurven und Flächen zweiter Ordnung in den endlichen Raumformen." 32 pp. March 2, 1911. Killing.

RECKERS, O.: "Untersuchungen über Kurvennetze ohne Umwege." 50 pp. July 25, 1911. von Lilienthal.

Rostock.

BLEICHER, K.: "Zur Theorie der übergeschlossenen Gelenksysteme." 75 pp. June 10, 1910. Staude.

BLENCK, G.: "Untersuchungen über das Amiotsche Theorem bei den Flächen zweiter Ordnung und über Erzeugungsarten des elliptischen Kegels." 91 pp. March 16, 1911. Staude.

GEISSLER, J.: "Die Gleichgewichtsbedingungen der Raummechanik mit besonderer Berücksichtigung der elektrischen, magnetischen und Gravitationserscheinungen." 86 pp. March 2, 1911. Weber.

Strassburg.

FINZEL, A.: "Die Lehre vom Flächeninhalt in der allgemeinen Geometrie." 46 pp. Feb. 22, 1911. Schur.

GLASER, F.: "Ueber die Galoissche Gruppe der Gleichung 16. Grades, von der die 16 Knotenpunkte der Kummerschen Fläche 4. O. abhängen." 30 pp. Feb. 27, 1911. Weber.

HARTWIEG, O.: "Konstruktion der Hauptachsen des Ellipsoides aus drei konjugierten Durchmessern." 17 pp. Nov. 7, 1910. Schur.

KILL, P.: "Beiträge zum Fundamentalproblem der Flächentheorie." 49 pp. Nov. 14, 1910. Schur.

MEYER, S.: "Struktureigenschaften der projektiven Invarianten von Formen mit n Variabeln." 43 pp. Dec. 15, 1911. Weber.

MOHR, R.: "Die Bertrandschen Kurven in der Theorie der Normalensysteme." 38 pp. Feb. 22, 1911. Schur.

SCHMEDES, W.: "Analytische Behandlung der Bewegungen im nichteuklidischen Raume." 33 pp. Dec. 9, 1910. Schur.

Würzburg.

ENGELHARDT, PH.: "Untersuchungen über die im Schlusswort des Lie'schen Werkes 'Geometrie der Berührungstransformationen' angedeuteten Probleme." 65 pp. Jan. 18, 1911. Rost.

HAUPT, O.: "Untersuchungen über Oszillationstheoreme." 50 pp. June 27, 1911. Rost.

THE philosophical faculty of the University of Göttingen announces the following problem for the Beneke prize for 1915:

A complete discussion of the problem of viscous motion from the standpoint of hydrodynamics. The discussion, either theoretical, experimental or both, should advance our present knowledge of the resistance offered to the motion of a solid in a fluid and the resistance to fluid motion in tubes and canals. Competing memoirs may be written in any modern language, should be signed with a motto, and must be received by the faculty by August 31, 1914. The major prize will be M. 1,700 and the minor M. 680.

THE Copley medal of the Royal Society has been awarded to Professor F. KLEIN "for his researches in mathematics."

DR. K. BARTEL has been appointed docent in geometry in the technical school at Lemberg.

DR. E. HECKE has been appointed docent in pure mathematics in the University of Göttingen.

DR. KADERAVEK has been appointed docent in synthetic geometry in the Bohemian technical school of Prague.

AT the University of Munich the following changes have been made: Dr. F. HARTOGS has been promoted to an associate professorship; Dr. A. ROSENTHAL has been appointed docent; Dr. H. DINGLER has been appointed docent in the history and teaching of mathematics.

Dr. J. V. E. WESTFALL, of the Equitable life assurance society, has been promoted to the position of acting third vice-president. Dr. Westfall was formerly assistant professor of mathematics in the University of Iowa.

THE announcement in the Notes of the December BULLETIN that Mr. G. H. ALBRIGHT had been appointed exchange professor to Harvard University proves to be inexact.

AT the close of the present academic year Professor W. E. BYERLY, of Harvard University, will retire from active service with the title of professor emeritus.

THE death is announced of Professor G. LANDSBERG, of the University of Kiel, on September 14, 1912, at the age of 47 years.