drocarbon rearrangement and carbonium ion polymerization. It thus represents a thorough coverage of a wide variety of reactions proceeding through carbonium ion intermediates.

As might be expected in a volume that contains chapters written by many different authors, a few chapters are in conspicuous contrast to the majority, which are thoroughly done and well presented. It is somewhat regrettable that the poorest chapter is that on the classical example of the Friedel-Crafts reaction, the condensation of alkyl halides with aromatics.

The book is well printed, largely free of errors, and deserves to be on the reference shelf of any chemist interested in acid-catalyzed reactions proceeding through carbonium ion intermediates.

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Mathematical Recreations

Mathematical Games and Pastimes. A. P. Domoryad. Translated from the Russian edition (Moscow, 1961) by Halina Moss. Pergamon, London; Macmillan, New York 1964. xii + 298 pp. Illus. $5.

This book was written as a sourcebook for games, contests, and extracurricular activities in Russian schools. It includes a great variety of problems, puzzles, number tricks, games, and geometric constructions. Some of the material is already available in other publications, but many of the ideas and mathematical analyses are original. In explaining the mathematical basis for the recreations, Domoryad uses a multitude of mathematical ideas most of which relate to algebra, geometry, or number theory.

The first few chapters deal with system of numeration and topics in number theory. This is followed by arithmetical tricks, puzzles, and shortcuts. Next, winning moves in such games as Nim, Fifteen, chess, dominoes, and magic squares are analyzed. Geometric constructions such as regular polygons and polyhedra, parquets, borders, symmetry, curves, moebius strips, networks, and maps are treated, and some attention is given to cutting and reassembling geometric figures, to the construction of pleasing patterns, and to paper folding. The final sections include a variety of classical problems and puzzles.

The activities presented apply mathematical ideas to an amazing variety of situations. Hence, the book may be used to search for original solutions to unusual problems and theorems. Although some problems are fully analyzed, only references to solutions are provided for others, and unfortunately most of the sources cited are not available in the United States. At the end of the book answers are given for some problems; for others, questions and hints are given to help the reader discover the solution. However, it is very difficult to locate answers to specific problems, because no reference numbers are used.

Since the book was originally published in Russian and was translated by an Englishwoman, many symbols, algorithms, and terms will be strange to Americans. For example, in long division, the divisor is written to the right of the dividend and the quotient below the divisor. A three-digit numeral is expressed as $\overline{a\ b\ c}$, and improper fractions are called "vulgar fractions." The layout, with little variation in format or organization, no color, and no numbered paragraphs for easy reference, gives the book the appearance of a college textbook rather than a book intended for recreational use. The abbreviated proofs, extensive use of symbols, and technical language will make the book enjoyable to the sophisticated reader but may discourage the immature student.

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Geology of Africa

Geological Map of Africa. Prepared by UNESCO and the Association for African Geological Surveys. UNESCO, Paris, 1964 (available from UNESCO Publications Center, New York). 9 sheets and *Explanatory Note* (39 pages). Set, $55.

This spectacular new map covers all of Africa and Madagascar, as well as Saudi Arabia and adjoining parts of the Middle East. It is at once a magnificent base from which to develop the subsurface resources of a continent and a monument of international scientific collaboration. It was compiled by the Association of African Geological Surveys, under the direction of Jean Lombard, on Belgian and French base maps, printed by an Italian firm with UNESCO support, and follows the conventions of the Commission for the Geological Map of the World of the International Geological Congress. Each sheet is an independent unit—sheets 1 to 6, 8, and 9 include their own explanation, while sheet 7 is a more detailed explanation for the entirety. A fuller explanation, summary, and geographically arranged list of sources are provided in the accompanying *Explanatory Note* by Raymond Furon and Jean Lombard, outstanding French students of African geology. The text and explanation are in both English and French. Geographic names and features but no political boundaries are shown. The inclusion of the insular geology and bathymetry of the surrounding oceans enhances the usefulness of this map.

Those familiar with the map of Africa which was prepared by the same association, and published in pieces between 1938 and 1952 by the Bureau d'Études Géologiques et Minières Coloniales in Paris, may well wonder why a new map so soon. Actually the new map represents the same sort of advance over the map published between 1938 and 1952 as the 1957 map of the U.S.S.R. represents over that published in 1937. Intensive postwar geological reconnaissance covering nearly all of Africa is here summarized. Indeed, no other continent has had so comprehensive and detailed an assessment of its substructure at so early a stage in its economic development.

Striking features of the geology of Africa brought out by this map are the prevalence of Precambrian rocks and of continental deposits of all ages. Some 57 percent of the total surface of the continent is underlain by Precambrian, at many places the host-rock for deposits of copper, iron, manganese, gold, and uranium. Continental deposits are abundant from Precambrian to Recent—tillites and associated sediments referred to as the Basal Continental; the so-called Nubian sandstones of Cambrian to Middle Cretaceous age; the red beds, tillites, coal measures, basalts, and the like of the Karroo Series; the "Continental intercalaire," mainly Mesozoic, with plants and dinosaurs; and the fossiliferous "Continental terminal," spanning the Tertiary. Quaternary beds of continental facies are also widespread, including the desert sands of the north