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Mathematics (Class QA)

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I. Scope

This Collections Policy Statement covers the subclass QA (Mathematics), with exception of major subset, QA75-QA76 (Computer Science), which is addressed in a separate Collections Policy Statement. Since the Library of Congress does not support a specific mathematical study or program, the collection includes a broad overview of titles that reflect the interest of both theoretical and applied mathematicians. Examples of mathematical studies covered under subclass QA are the following: algebra, analytical mechanics, combinatorics, elementary mathematics, geometry, mathematical logic, mathematical statistics, probabilities, numerical analysis, and number theory. Also represented are subjects on mathematical education, studying & teaching mathematics, history of mathematics, mathematical biographies, and the bibliographies of mathematics (Z6651-Z6655). Works in all formats are collected, including print materials, electronic resources, audio-visual, and microform. Applied mathematical subjects that relate to Astronomy (QB), Business (HF/ HG), Engineering (T), Life Sciences (QH), and Physics (QC) are not addressed in this statement.

II. Research Strengths

A. General

Retrospective, as well as the current literature, are central to the work of mathematicians, and the Library's mathematics collection reflects this view. In terms of size alone, the mathematics monograph and serial collections surpass that of any other library in the country. By recent count of the General Collections (June 2008), over 140,000 serial and monograph items fall into subclass QA (Mathematics). These numbers are augmented by mathematics holdings in the area studies, audio-visual, electronic, manuscript, microform, and special collections.

The importance of serial literature in the field of mathematics cannot be overemphasized. A *RLG Verification Study in Mathematical Journals*, conducted in 1985, ranked the Library of Congress sixth overall among 22 institutions, in collecting basic, research, and historical journals. The Library was ranked second for its historical collection. Through the years, the Library has received a steady influx of mathematical titles, ranging from important to obscure, and resulting in a large number of foreign

journal runs. One especially noteworthy example in the Library's collection is the *Journal für die reine und angewandte Mathematik* (also known as *Crelle's journal*) by A. L. Crelle, thought to be the first published mathematical journal not published as a proceedings/transaction by an academy or learned society. The Library's holdings of *Crelle's journal* stretches back to its inception in 1826.

The Library's mathematics collection is particularly strong in foreign language materials. In mathematics particularly, a significant number of publications necessary for research are published in Russia, Japan, and Europe. Mathematics has long been a Russian specialty, and Russian mathematicians are considered to be among the best in the world. The Library is, therefore, fortunate to have an extensive collection of Russian mathematic serials and monographs. Many of the cover-to-cover translations which are secured by the Library through the legal requirements of the copyright deposit would otherwise have to be purchased at prohibitive cost, and hence may not be generally available elsewhere.

The Library possesses impressive holdings of publications from mathematical societies and academies and actively seeks materials from a large array of international institutions. Extensive runs of literature from international scientific societies such as the Royal Society of London, Louis XIV's Académie des Sciences in France, and the Akademie der Wissenschaften in Berlin are acquired by the Library. Publications from the American Mathematical Society, the International Congress of Mathematicians, and the International Mathematical Congress are also well represented in the Library's collection, with many items being unique to the Library of Congress, such as publications from smaller societies and organizations.

It is not widely known that Thomas Jefferson was an avid student of mathematics and that this training was vital to his achievements in agriculture, architecture, astronomy, and law. Jefferson had an enormous impact on the promotion of the study of mathematics at West Point and University of Virginia. Following in the steps of Thomas Jefferson, the Library recognizes the importance of mathematical education. This is reflected in a broad collection of titles on the various methods of studying and teaching of mathematics. Among this collection are publications from the Association of Teachers of Mathematics, Mathematical Association of America, National Council of Teachers of Mathematics (NCTM) and ERIC reports.

The Library, in an effort to improve on currency and access to its mathematical collection provides access to abstracting and indexing services in electronic format, but also to full text databases. Electronic resources that are currently of interest to the mathematics research include *Academic Search Premier*, *ERAM Jahrbuch Database*, *History of Science, Technology, and Medicine*, *INSPEC*, *JSTOR*, *Knovel Library*, *Mathematics Didactics Database*, *Project Euclid*, *Proquest*, *Royal Society Online Journals*, *Web of Science*, and *Zentralblatt MATH*.

B. Areas of Distinction

The Library's Rare Book and Special Collections Division holds important first editions of the works of many famous mathematicians and other seminal books in the field of mathematics. Among these are a copy of the first printed edition of Euclid's *Elements*, a work which has seen over a thousand editions. Archimedes' writings are represented by the *Opera, quae quidem extant, omnia*, of 1544, the first complete edition of his work. The Library has a 1561 edition of *The Grounde of Artes*, also referred to as *Arithmetike*, by Robert Recorde. *Arithmetike* is cited as the most influential English textbook of the sixteenth century.

The Library possesses landmark works by prominent women mathematicians. Maria Gaenta Agnesi's *Instituzioni Analitiche ad uso della Gioventu' Italiana* (1748), the first surviving mathematical work written by a woman, is one such treasure. Landmark works by Mary Everest Boole, Emile du Chatlet, Mary Somerville, and Emmy Noether also demonstrates the richness of the Library's mathematical collections.

Also deserving attention are the Library's collection of the major works of influential mathematicians such as Leonard Euler, Karl Friedrich Gauss, David Hilbert, Joseph Louis Lagrange, William Oughtred, Bernard Reimann, John Wallis, and Karl Weisstrass.

One can also find unique mathematical material in the Library's area studies collections. A noteworthy example is the Asian Division's collection of 403 titles of Japanese traditional mathematics called *wasan*.

Another area of distinction is the collection of early American mathematic books and periodicals before 1900. Among these are a copy of Isaac Greenwood's *Arithmetick vulgar and decimal: with the application thereof to a variety of cases in trade and commerce* (1729), which is credited as the first English mathematical textbook written by an American and published in what is now the United States. A collection of Nicolas Pike's 1st edition (1788) and revisions (1797, 1798, 1804, 1809) of *A new and complete system of arithmetic, composed for the use of citizens of the United States* are also held by the Library. Among the Library's early American mathematical periodicals titles are the brief, but notable runs of *Cambridge miscellany of mathematics, physics, and astronomy*, which is recognized as the first American mathematical periodical edited by scholars, and popular mathematical periodicals such as *Mathematical correspondent*, *Mathematical diary*, *Mathematical Miscellany*, and *Mathematical monthly*. Other strong areas of note are the works of influential American mathematicians George David Birkhoff, George Bruce Halsted, Eliakim Hastings Moore, R. L. Moore, and the papers of Oswald Veblen.

III. Collecting Policy

The Library collects in mathematics on a worldwide basis, primarily at the Research Level and acquires materials in all formats and languages. The "Copyright Best Edition" statement is used in conjunction with this policy to maintain the Library's collecting strengths in mathematics and to support the work of Congress, scholars, educators, and citizens throughout the country and the world. As more publications are issued digitally, the Library must ensure that all important and appropriate information is added to the collections and that the formats represented are maintained to assure continued access.

Electronic obsolescence is not an option for mathematical materials. Some e-journal and born digital materials are collected at the lower level, because the current copyright law does not address the deposit of electronic materials and some of the mechanics associated with the acquisition, storage and display of these materials have not been resolved. As e-prints, podcasts, webcasts, and new technologies for creating mathematical material proliferate and the cCopyright law includes these materials as depository items, they will be collected at the same rate as their counterparts, using the same criteria. Other relevant collections policy statements at the Library of Congress include statements on Electronic Resources, Web Capture and Archiving, and Dissertations.

IV. Acquisition Sources: Current and Future

As new mathematical concepts and solutions are applied to old problems it is vital for the Library to continue collecting mathematical literature at the Research Level, regardless of format. Currently the Library of Congress relies on copyright deposits, Cataloging in Publication (CIP), Library's field offices, purchase, gift and exchange sources for acquisition of its mathematical collection. In the future, it is hoped that the Library will incorporate electronic deposits of digital material and born-digital e-journals and eBooks into its collection. The mathematics collection would also benefit from cooperation with learned societies, research institutes, and major universities, both foreign and domestic, with archiving and capturing mathematical web content. One such example of material that warrants capturing and preserving is the American Mathematical Society's born digital Mathematical Genealogy project, in which currently no print copy exists because of the dynamic nature of the content. Another area that requires attention is the collecting and preserving of open source mathematical collections for which no print copy is published.

V. Collecting Levels

LC Classification	Collecting Levels
QA1 Periodicals, societies, congresses, and serial publications	4
QA3 Collected works (Nonserial)	4
QA5 Dictionaries and encyclopedias	4
QA7 Addresses, essays, and lectures	4
QA8 Philosophy	4
QA8.7 Study and teaching, research	4
QA9-10.35 Mathematical logic, classical logical systems, non-classical formal systems, proof theory, fuzzy logic, model theory, matrix logic, algebraic logic, Boolean algebra, quantum logic	4
QA10.4 Information theory in mathematics	4
QA10.5 Mathematics as a profession, vocational guidance	3
QA11-QA20 Study and teaching, research	4
QA21-QA29 History and biography	4
QA30 Directories	4
QA30.3- QA35 Early works through 1800. Egyptian, Greek, Medieval	4
QA36-QA39.2 General works, comprehensive treatise, textbooks	4
QA40 Handbook, manuals, etc	4
QA40.5 Juvenile works	3
QA41-43 Formulas, notation, abbreviations, and problems	3
QA47-QA59 Tables	4
QA63-74 Problem solving, instruments and machines	3

QA77-93 Miscellaneous geometrical instruments	3
QA93-99 Popular works, mathematical recreations, miscellany and curiosa	3
QA101-QA119 Elementary mathematics, arithmetic, counting, fractions, roots	3
QA135-150 Study and teaching, numeration	4
QA150-162 Algebra	4
QA164- 271 Combinatorics, graph theory, group theory, matrices, theory of equations, number theory, set theory, game theory	4
QA273-QA280 Probabilities, Stochastic process, statistics	4
QA281-295 Interpolation, sequences, series	4
QA297-433 Numerical analysis, foundations, calculus, theory of functions, differential equations	4
QA440-QA608 Geometry	4
QA609-699 Topology, infinitesimal geometry, convex geometry, discrete geometry, differential geometry, foundations of geometry	4
QA801-939 Analytic mechanics	4
Z6651-Z6655 Bibliography	4

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