

Final Report of the National Committee of Fifteen on Geometry Syllabus

1912

Why?

At the turn of the century, many high schools recommended two courses of study in mathematics: algebra and geometry. They did so at the risk of rising failure rates in both courses. E.H. Moore espoused the views of J. Perry out of England. “The major reform advocated by Perry was to allow the study of many ‘essential notions of trigonometry, algebra, geometry, and even calculus, without proofs’” (NCTM, 1970, 388). By solving problems in an exploratory fashion, students would learn analytic skills and be able to apply this to their work in mathematics. In his speech as outgoing president of AMS in 1902, Moore urged schools to look at more integration of mathematics and science and to use applications and lab-teaching techniques in math classrooms. “Moore proposed an ambitious program of educational reform for secondary schools and colleges. He championed the “laboratory method” of instruction and called for mathematicians to take a larger role in educational issues” (Roberts, 2001). Making geometry more concrete would also allow the ideas of geometry to be introduced to children in earlier grades. “His picture of mathematics included integration, manipulatives, group learning, and technology. Moore recognized the need for change because he saw a curriculum steeped in the algorithms of arithmetic as unconnected to the real world and not designed to be studied by all” (Lott, 2004). Moore urged improved teacher content knowledge through professional training and the development of junior high schools and junior colleges in the United States.

What?

In response to the needs of the day, the American Federation of Teachers of Mathematical and Natural Sciences and the National Education Association jointly commissioned The National Committee of Fifteen on the Geometry Syllabus in 1908. In 1911 its Provisional Report was published in *School Science and Mathematics* journal of the Central Association of Science and Mathematics Teachers.

Who?

Members of the Committee of Fifteen from Higher Education Institutions

Charles L. Bouton, *Harvard University*
Florian Cajori, *Colorado College*,
Herbert E. Hawkes, *Columbia University*
Earle R. Hedrick, *University of Missouri*

Henry L. Rietz, *University of Illinois*
David Eugene Smith, *Teachers College, Columbia University*
Herbert E. Slaught, *Chairman, University of Chicago*

Members of the Committee of Fifteen from Secondary Schools

William Betz, *East High School, Rochester, NY*
Edward L. Brown, *North High School, Denver, CO*
William Fuller, *Mechanic Arts High School, Boston, MA*
Walter W. Hart, *Head of the Mathematics Department,
Shortridge High School, Indianapolis, IN*
Frederick E. Newton, *Andover Academy, Andover, MA*
Eugene R. Smith, *The Park School, Baltimore, MD*
Robert L. Short, *Technical High School, Cleveland, OH*
Mabel Sykes, *Bowen High School, Chicago, IL*

The Committee of Fifteen appointed three subdivisions. The first subdivision, under the chairmanship of David Eugene Smith, was to investigate “logical considerations.” The second subdivision, under the chairmanship of Henry L. Rietz had charge of “exercises and problems.” The last subdivision, which determined the “lists of theorems,” had Earle R. Hedrick as its chairman.

Each subcommittee met independently over the course of a year and a half. Although they occasionally submitted reports, the results were not fully compiled until 1910 when the chairmen of the subcommittees, the general chairman, and three other members met to examine the findings. When amendments had been made and agreement was reached on all points, the report was submitted to the remaining members of the committee. At this time, the report was given to 200 advisors who were also invited to submit responses.

The report was presented at the San Francisco meeting of the National Education Association in 1911. It was again critiqued and the committee reworked the document until everyone reasonably agreed on all points. It was then distributed to 2000 members of mathematics associations and to 3000 more people who made personal requests. In this form it met unanimous adoption at the 1912 NEA meeting in Chicago.

What was produced?

The report recommended a geometry syllabus. The report contained five sections:

- A. Historical Introduction
- B. Logical Considerations
- C. Special Courses
- D. Exercises and Problems
- E. Syllabus of Geometry

Historical Review of Geometry in Schools

Reviewed the nature of geometry being taught in several European countries.

- Provided a brief historical review of popular geometry textbooks being used in the United States.
- Identified books and resources that illustrated attempts to reform the teaching of geometry.
- Stated the position of the committee as desiring a balance between the logical and concrete; the Formalist and the Utilitarian.

Logical Considerations

The committee recommended that

- a general list of axioms, definitions, postulates, and symbols be included in the syllabus;
- teachers be aware of the strengths and dangers associated with informal proofs, and argued that nearly 100 of the propositions (theorems) “must receive formal proof in any well-regulated course in geometry;”
- algebra and geometry be unified by including algebraic approaches and notation in geometry;
- algebra be taught in grade nine, geometry in grade ten, and algebra and geometry in grade eleven.

Special Courses

The committee recommended that

- geometry be taught in elementary grades with an informal focus;
- special courses not be developed to meet the needs of students with diverse vocational goals. Instead, various theorems should be omitted or emphasized to match student needs;
- some theorems be included without formal proof with heuristic reasoning provided to assure students of their validity;
- scale drawing and modeling be used to illustrate important theorems on measurement.

Exercises and Problems

The committee recommended that

- “long sets of exercises” that had been traditionally placed at the end of the book be redistributed;
- each theorem be accompanied by immediate concrete questions and applications;
- theorems be immediately followed by easy exercises and then by those more difficult;
- abstract and application problems be included in balance to make geometry more appealing to the average student;
- teachers access the problems provided by the committee to use in their classrooms.

Syllabus of Geometry

The committee recommended that

- the lists of theorems provided are not to be taken exhaustively and are not specified in any particular order;
- some “general statements” can be made of other theorems (e.g. No triangle can have more than one right angle or more than one obtuse angle.);
- students should frequently state and prove propositions in language resembling that to be found in any other mathematical textbook;
- emphasis be placed on the theorems that are central to study, with the intent that they would provide an outline in case some “trimming” was required.

Significance of the Report

- Called for a balance of informal and formal work in geometry and more concrete examples.
- Made clear the need for good pedagogy to support the learning of geometry.
- Geometry textbooks published after 1910 acknowledged the Committee of Fifteen and noted their alignment with the report, including the theorems listed in the report.
- The College Examination and Evaluation Board limited the items used on their college examination tests to items covering the theorems listed in this report. This became the definitive list of material required of a student to enter college proficient in Geometry.

References

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