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THE RELATION OF MATHEMATICS TO THE NATURAL SCIENCES[1]

IN considering the relationship of mathematics to the natural sciences, we shall do well to see what mathematics is and what are its methods.

Mathematics has not always been looked at through the same glasses. The field of mathematics to the early workers was number and quantity. Euclid put into his axioms what he considered to be the fundamental facts of the world about him. Diophantus, of Alexandria, a worker in algebra, considered only positive roots of equations. They were dealing with realities and not with abstract matters. Some time later mathematicians tried to prove their axioms—often called self-evident truths—and made a wonderful discovery. That was, that a "self-evident truth" might be replaced by its contrary and the result still be a consistent body of doctrine. And thus the glasses were changed, to be mathematical the conclusions must be the result of the assumptions and these must be consistent. The assumptions need have no physical interpretation, indeed they might contradict any of our theories, but they must not contradict each other. There might be foreign war, but no internal conflict. I like the following of Professor Keyser, of Columbia University:[2]

He (the mathematician) is not absolutely certain, but he believes profoundly that it is possible to find axioms, sets of a few propositions each, such that the propositions of each set are compatible, that the propositions of such a set imply other propositions, and that the latter can

[1] Read before the Purdue University chapter of Sigma Xi, October 25, 1916.

[2] SCIENCE, Vol. 35 (1912), p. 107.