• HISTORICALLY SPEAKING,—

Edited by Phillip S. Jones, University of Michigan, Ann Arbor, Michigan.

Tying mathematics to its history

Contributed by Raymond L. Krueger, Wittenberg College, Springfield, Ohio

Mathematics is so often accused of being dry and uninteresting. To me this is a real challenge for the teacher. Most of the content material *can* be taught by *just* a lot of good hard drill and practice. But as such it's no wonder students "moan and wail."

There's so much to teach and so little time. I'm for teaching less and doing it more thoroughly. This rapid skimming over a quantity of material may be all right for a lot of subjects, but it doesn't work in highly sequential mathematics; too many vital things are thereby only partially learned. The continuing student later pays the price. It is so often then well-nigh impossible to go back and master the preliminaries needed. No wonder originally eager mathematics majors soon become discouraged. They are confronted with too many gaps to fill.

So let us by all means teach, what we do teach, well. Anything which helps toward this end is all to the good. I'm reminded of several episodes out of the history of mathematics which tie in excellently with this: There are, of course, many others which the inquiring teacher will easily find, and use. Some are so classic as to be essential in the cultural background education of students, even if little is contributed thereby to their mathematical ability. I mean such items as (1) the bath episode of the discovery of Archimedes' principle, (2) the three famous problems of Greek geometry, (3) Zeno's paradoxes.

A fourth is the old story of the race between Achilles and the tortoise. This, used when we come to infinite geometric progressions with ratio less than one, really starts the class thinking (reference 4).

Another is Fermat's last theorem. This can be introduced in high school very nicely in connection with the Pythagorean theorem. I use it for our course in analytic geometry when we study the family of curves $x^n+y^n=a^n$ (see reference 5).

A sixth is the attempt of the Pythagoreans to suppress the troublesome discovery of the new type of number $\sqrt{2}$. It is a fine introduction to irrationals (see reference 6).

None of these have to be developed extensively, nor do they take any appreciable class time. But they do supply the occasional spice and zip that can be so stimulating. Some helpful references for these and other historical anecdotes are:

1. Bell, E. T. *Men of Mathematics.* New York: Simon & Schuster, Inc., 1937. P. 29.
2. Rupert, W. W. *Famous Geometrical Theorems.* Boston: D. C. Heath & Co., 1900. Ch. III, IV, VI.
3. Cajori, Florian. *A History of Mathematics.* New York: The Macmillan Co., 1919. Pp. 23–24.
4. Struik, D. J. *A Concise History of Mathematics.* New York: Dover Publications, 1948. P. 49.
5. Eves, Howard. *An Introduction to the History of Mathematics.* New York: Rinehart & Co., Inc., 1953. Pp. 288–89.
6. Hooper, Alfred. *Makers of Mathematics.* New York: Random House, Inc., 1948. P. 74.

George Washington and mathematics education

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The extract from Nicholas Pike's *New and Complete System of Arithmetic* on page 40 of the January, 1954, issue of THE MATHEMATICS TEACHER together with the comments on the advertising recommendations in *Palmer's Pocket Scale* on page 503 of the November, 1953, issue recalled to me an interesting mathematical letter written by George Washington to Nicholas Pike commending his book. I located this while doing research on Pike and his arithmetics in his home town, Newburyport, Massachusetts. It was printed on pages 327–32 of Mrs. E. Vale Smith's *History of Newburyport*, which was published in that town in 1854. Katherine M. Kuechle, librarian of the Newburyport Public Library, sent me this copy. She and her staff were most helpful at the time I sought this and other data about Pike and Michael Walsh, author of another early American arithmetic. The original is now in the "Papers of George Washington" collection of the Library of Congress.

The letter itself is self-explanatory. It contains comments which are quotable in discussions of some of our present mathematics-education problems:

Mount Vernon, June 20th, 1788.

Sir:—I request you will accept my best thanks for your polite letter of the 1st of January, (which did not get to my hand till yesterday) and also for the copy of your "System of Arithmetic," which you were pleased to present to me.

The handsome manner in which that work is printed, and the elegant manner in which it is bound, are pleasing proofs of the progress which the arts are making in this country. But I should do violence to my own feelings if I suppressed an acknowledgment of the belief that the work itself is calculated to be equally useful and honorable to the United States.

It is but right, however, to apprise you that diffident of my own decision, the favorable opinion I entertain of your performance is founded rather on the explicit and ample testimony of gentlemen confessedly possessed of great mathematical knowledge, than on the partial and incompetent attention I have been able to pay to it myself. But I must be permitted to remark that the subject in my estimation holds a higher rank in the literary scale than you are disposed to allow. The science of figures, to a certain degree, is not only indispensably requisite in every walk of civilized life, but the investigation of mathematical truths accustoms the mind to method and correctness in reasoning, and is an employment peculiarly worthy of rational beings. In a cloudy state of existence, where so many things appear precarious to the bewildered research, it is here that the rational faculties find a firm foundation to rest upon. From the high ground of mathematical and philosophical demonstration, we are insensibly led to far nobler speculations and sublime meditations.

I hope and trust that the work will ultimately prove not less profitable than reputable to yourself. It seems to have been conceded on all hands, that such a system was much wanted. Its merits being established by the approbation of competent judges, I flatter myself that the idea of its being an American production, and the first of the kind which has appeared, will induce every patriotic and liberal character to give it all the countenance and patronage in his power. In all events, you may rest assured that as no person takes more interest in the encouragement of American genius, so no one will be more highly gratified with the success of your ingenious, arduous and useful undertaking, than he who has the pleasure to subscribe himself, with esteem and regard,

Sir, your most obedient and very humble servant,

G. WASHINGTON.

Nicholas Pike, Esq.

It might, incidentally, be asked what it was there in the town of Newburyport which stimulated and encouraged these two men, Nicholas Pike and Michael Walsh, and made it the home of two early American arithmetics.

Newburyport was a thriving, prosperous seaport town with extensive and lucrative overseas and coastal trade. As an indication of the wealth of the town, the town gave to the support of the Revolutionary Cause at least a half million *pounds* in cash and goods. There was some manufacturing

as indicated by the fact that the first broadcloth made in the country was manufactured close by.

The demands for training for commercial pursuits, as well as for college preparation were met by the town "Grammar School." Since most of the Newburyport youth who were destined for the university attended Dummer Academy near Newburyport, a majority of the scholars in the town school were interested in "commercial" applications.

So it is not surprising to find that a large part of Pike's *Arithmetic* deals with simple and compound interest, annuities, insurance, exchange of money, and partnerships. In order that his book might contain the decimal system of coinage being proposed, the publication of his book was delayed until Congress authorized our present system of coinage.

Beyond this material there is some material on "plain" geometry and "plain" trigonometry as well as measurement of solids and an "Introduction" to algebra.

The book was popular partly for patriotic reasons. There was a natural reaction against British texts. Mr. John Scales, an editor of Manchester, New Hampshire, wrote later, "They (British texts) were faulty, heavy, obscure, and not at all adapted to conditions existing in America. The practical work of the schoolroom no less, perhaps, than his patriotism prompted him to make a change." The young republic had a "pound shortage" and was anxious to establish "home" industries. And there was need for a book which would give problems of local interest and application.

Nicholas Pike, too, merits a few comments. A Harvard graduate, he was appointed master of the third parish grammar school at a salary of 80 pounds in 1773. It is interesting to find that the school committee voted in 1780 "that the schoolmasters' salaries be raised in proportion to the rise of mechanics' wages, taking their salary in 1774 to be the standard."

He was also town clerk, a selectman, and a justice of the peace. Some of the people who came before him complained that he dealt with them as severely as he did with his scholars. He gave a sum of money to establish a scholarship at a school in Andover, Massachusetts, and, finally, Harvard honored him with a master of arts degree.

The Cooperative Committee on the Teaching of Science and Mathematics of the American Association for the Advancement of Science

At the annual spring meeting of the AAAS Cooperative Committee on the Teaching of Science and Mathematics held in Chicago, Illinois, John R. Mayor of the University of Wisconsin was elected chairman. Dr. Mayor, for several years the representative of the Mathematical Association of America on the committee, succeeds Morris Meister, principal of the Bronx High School of Science and representative of the National Science Teachers Association. Laurence L. Quill of Michigan State College, representing the Division of Chemical Education of the American Chemical Society, was elected to the newly created office of vice-chairman. Bernard B. Watson of the Operations Research Office of Johns Hopkins University, representing the American Association of Physics Teachers, was re-elected secretary of the committee. The National Council of Teachers of Mathematics is represented on the committee by George E. Hawkins of Lyons Township (Illinois) High School and Junior College.