

- (5) Non-Euclidean geometries: Geometry of Riemann, Geometry of Lobachevsky and Bolyai.
- (6) Hyperdimensionality.
- (7) The three famous problems: Trisection of the Angle, Squaring the Circle, Duplication of the Cube.
- (8) Appreciation of the importance of mathematics in the progress of civilization; applications; utility; "pure" versus "applied" mathematics with interesting historical sidelights.
- (9) Philosophy of mathematics.

SOME EXPERIMENTS IN GEOMETRY EXAMINATIONS ETC.

By W. M. FISHBACK,

High School, Sacramento, California.

At the close of last year's work I tried a couple of experiments in my geometry examinations that have been helpful to me, and I trust that they may be suggestive to others. The first was with two of my sections that had done but a half year's work, while the second was with a class that had completed the course for the year.

The first sections had studied to page one hundred seventeen, Wentworth-Smith Geometry. I asked them to open their books and pick out seven propositions in Book One and three in Book Two that they liked best, and tell why they liked them. Several of the students afterwards told me that they thought that they were going to have a snap, but after working for two whole periods they changed their minds. The data that I collected was both instructive and helpful to me, and the test was a departure from the old form of examinations, into which the students entered most enthusiastically. In many cases the reasons were, "Because the proposition was easy to understand"; but in many others the reasons were utilitarian, such as, "Helped me in cutting out a dress," and, "Helped me in setting up my tent."

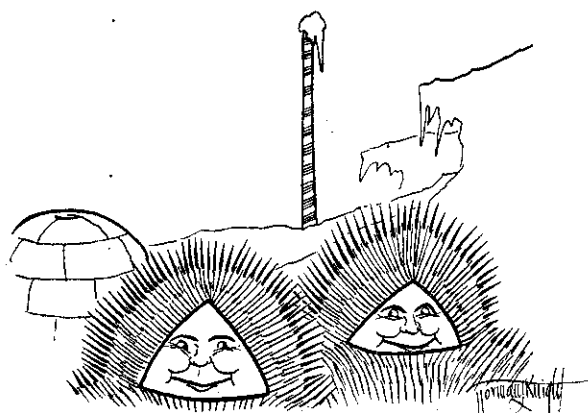
Out of forty who took this test, eighteen preferred as one of their ten, Proposition Nineteen; sixteen like Propositions One, Two, and Thirty-two, Book One; fourteen chose Eleven and Eighteen, Book One, and Eleven, Book Two; and no one selected the Twentieth. I have purposely given the extremes because I do not desire to weary the reader, but the data on the other propositions is interesting. I do not claim that these results prove anything, I simply state that they have been helpful to me here in this particular field, and something of the kind might be helpful to others.

The class that had completed the year's work had an entirely

different kind of a task. They wrote on "Geometry." If they liked it they told why they liked it, and if they "hated" it they told why. If it had been helpful to them they enumerated the instances and if any particular parts appealed to them they wrote those up. Of course the content of these papers was more interesting than that of the first sections, because this class had the advantage of having completed the subject and consequently could be more definite.

I shall give briefly some of the statements that were made. However, I should like to produce in full some of the papers that I received. "It teaches a person to reason and to talk logically." "Therefore, the study of geometry is a social requirement and an absolute necessity for the advancement of the human race." "It helps one to ask the reason for things." "Geometry teaches one to reason, and in reasoning rests the key to success and prosperity." "It has helped me to argue with my classmates, and not give in unless I have been proved wrong; and, greater than this, it has helped me to take a defeat cheerfully." A majority of the pupils stated that geometry had helped them to reason.

The experiments were worth while to me because I now feel more optimistic over my work in geometry. With this pile of evidence before me I feel that the subject is most valuable to the boys and girls who have been with me but one short year. I also feel that the experiments were worth while to the students because they told me so and because I know that they summed up for themselves what they had gained by their labor.



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