

Again the consensus of opinion in centering on F which presupposes that the teacher is conversant in the history of the science, points to the fact that we as teachers of mathematics, must not longer neglect this important phase of our preparation.

So, in briefly summing up the results of this investigation, it should be said that superintendents and principals of high schools ought to insist that their teachers of mathematics should not overlook this part of their preparation in connection with their other professional studies. And we might be reminded that a well-rounded course of instruction of this character is within reach of every teacher in the United States, if not through his own local college or university, then through the correspondence-study department of the University of Chicago.

Also one is reminded that if he belongs to the group who do not believe it practicable or profitable to make use of history in teaching, either his convictions are unsound and need reorganizing, or else 97%, apparently, of our teaching personnel are misinstructed and are laboring under false educational principles.

#### WORTH WHILE WORK WITH ALGEBRA FAILURES.

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"Wm. G. S——, son of Charles S——, ex-postmaster, graduated with high honors from the University of Dentistry of Buffalo." This item cut from a small town news letter published in the local paper brought back to my mind a very vivid picture of my first review algebra class. It brought to my mind one of the members, a lanky boy of sixteen with twinkling blue eyes, who had failed in algebra so many times that he took his failure as a matter of course. Interested in fishing and trapping, he managed to be absent quite often, and finally, a few weeks before the state examinations were due, he decided to "quit school" altogether. However, in the review class, he had been "exposed" to much algebra theory and had taken many written lessons, the results of some of which had led him to look upon the subject with a little less disfavor.

Regent's week in a small town contributes its quota to local gossip. The boys and girls everywhere discuss their hopes and fears. It was even so that year—and William could not resist wanting to have a share in the excitement. He asked to be allowed to try algebra, was admitted to the examination, and passed! That was in 1916. Since then there have been other

Williams and Kenneths and Marys who have found algebra was not impossible in a review or repeat class. They may not all be graduated from college with high honors; they may not be graduated from college at all. But some of them will complete their course in high school who otherwise would have become discouraged and dropped by the way. All of them will have more confidence in themselves and will be of more use in the world for having wiped out the failure that stood against them in the first year of the high school course. This is the opportunity which the review class in algebra affords. Some years, I have not been permitted to organize such groups. However, in many schools throughout the country there is a real need for these special classes.

In the summer time, I have my garden. In it, I have some early and some late sweet corn. But I do not plant here and there a hill of the latter in my patch of early corn. Neither do I neglect to care for the late corn once planted, even though I know it will not mature in time to make a brilliant showing at the fair. And so with repeat algebra classes. Seldom do they make a brilliant showing, yet certainly they are worth while. Then let us organize them.

Once organized, the real work has just begun, for the material, old to them, must be presented in a simple, new, and attractive way. This is not attempting the impossible although the opening weeks are sure to prove discouraging. The pupils who fail do not belong to one but to several different types. One does not want to think of them as types at all, but as individual boys and girls who must be taught to face their failures squarely, to analyze the causes, and to do their best at all times, realizing that success is the result of intelligent, persistent, hard work. As with the pupils, so with the teacher of a repeat class. She must work hard. She must be persistent. She must show intelligence in selecting and discarding methods, dealing with human nature, and facing her failures and successes sanely. Above all, she must believe that work with algebra failures is truly worth while.

To help pupils to face their failure and to analyze the causes, I ask each at the beginning of the course to write on a slip of paper his name, age, and the number of weeks he has had instruction in algebra, and what he believes was the reason for his failure. This information, which I keep for ready reference proves useful as well as entertaining. Last year, I found

several had had instruction 120 weeks, and some even laid claim to 140! The reasons given for failure were various. A few did not understand fractional equations; others, written problems. One girl maintained that her first term had been spent under a poor teacher, while several of the boys admitted quite frankly that they had not studied enough. Many seemed never to have given the matter of failure a thought, stating simply that they did not know!

Such a blank is useful in that it starts each boy and girl thinking—and some of them—working at once. The time statement is itself a challenge to both teacher and pupil. As to the reasons for failure, I believe a conference with the teacher at the end of the first month would supply much light on the subject to those who seem in doubt. Inaccuracy of thought and work, lack of desire to think and work independently, reluctance to check results where the correct answers are known, and the general belief that a review class should be a lecture rather than a laboratory course, all these trials characterize the opening weeks. Methods for making the crooked road straight must vary with the size and personnel of the class, the size and seating arrangement of the class room, and I was about to say the size and personality of the class teacher.

In a high school of from one to two hundred enrollment, the repeating division would number probably between eight and eighteen. Should the class be made up of "plodders" for the most part, then regular assignments from the text with frequent written reviews may be used. If the weekly averages are graphed in colored chalk on the board, with the names corresponding to the various colors beneath the chart, a friendly rivalry may be inspired. Particularly is this true if no grades below sixty are graphed: More frequently than not the review class has as many "live wires" as "plodders," and occasionally the former are in the majority. When such is the case, the teacher should be prepared to have her patience and her ingenuity taxed to the limit each day. I have found it best to abandon textbook work for such classes, and most outside written assignments in favor of the written test for four successive days followed by an explanation day on the fifth. Again, weekly averages may be graphed. It helps to equalize the differences which in turn results in keener rivalry if an occasional "bargain day" occurs when extra credit is given for extra problems.

In larger schools where the divisions number from twenty to

thirty-five, the daily written lesson plan, and blackboard graph is impracticable. If the class room is crowded, many excellent interest-getting plans have to be abandoned. Under such conditions, I depend upon a variety in class procedure to help stimulate interest. I give a daily assignment, written lessons as frequently as I can handle the papers, and use the blackboards rather sparingly. My aim is to have all the pupils functioning algebraically all of the class period. Cards, each one numbered, and each bearing a different exercise of the type being reviewed at the time, accomplishes this when other devices fail. The game—for we call it playing a game—is to see who can work the largest number correctly in a given time. Considerable interest results, if it is known previously that the record of each person will be posted on the blackboard, with honorable mention for each one making a perfect score. The work for the teacher may be lessened if the answers correspond in some way to the card number. For example, in the set for simplifying and adding radicals, Card No. 47 may have for its answer  $4\sqrt{7}$ , while Card No. 9 may read  $2\sqrt{18} - 4 + \sqrt{32} - 10\sqrt{2} + 13$ . A set of one hundred cards is sufficient for a class of twenty-five for a thirty-minute drill if a satisfactory method of exchange has been worked out previously.

I will not proceed further in the discussion of ways and means. Any whom I have convinced of the desirability of classes for the June failures, if indeed, I have convinced any, will become enthusiastic over the plan upon giving it a fair trial. And the Williams and Kenneths and Marys who are saved thereby for higher education and greater usefulness may rise up to call us blessed. If they forget to, we who have been some time in the profession shall not be too greatly surprised or disappointed. At least we will have done our part in helping to remove the bugbear from junior mathematics, and shall have felt the satisfaction which comes with worth-while work.

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#### INCREASE IN PIG IRON.

The production of pig iron, excluding ferroalloys, as reported to the Geological Survey, was 36, 242,748 gross tons, an increase of 19 per cent as compared with 1919. The quantity of pig iron, exclusive of ferroalloys, shipped or used in 1920, according to producers' reports, amounted to 35,710,227 gross tons, valued f. o. b. at the furnaces at \$1,140,904,096, an increase of 19 per cent in quantity and of 47 per cent in value as compared with 1919. The average price per ton at furnaces in 1920, according to these figures, was \$31.95, as compared with \$25.75 in 1919.