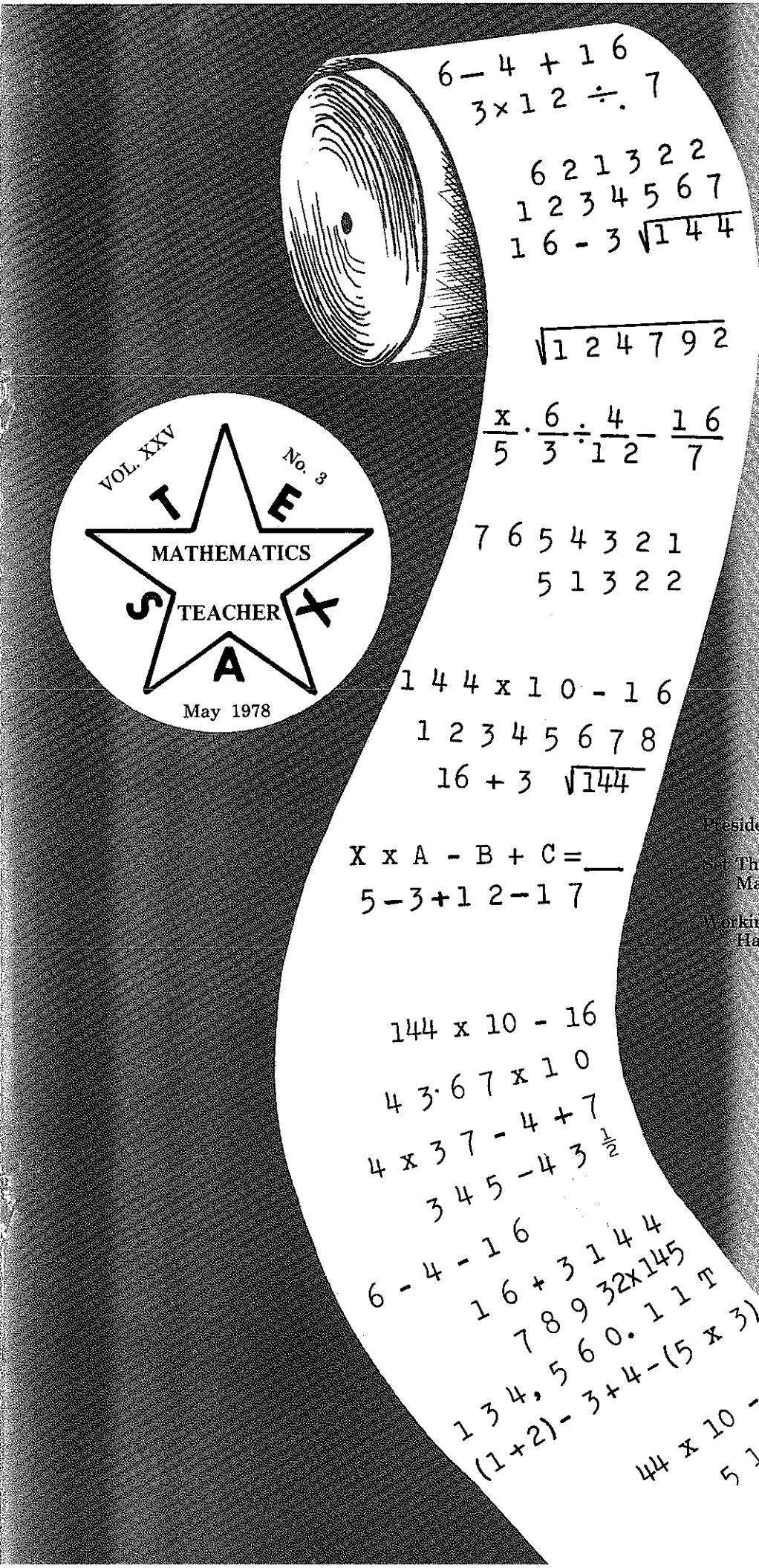

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PRESIDENT'S MESSAGE

For years the only school related item in the media were twenty lines on the back page or a filler on the air about the monthly school board meeting, education, or the lack of it, now makes the front page and prime time television.

During these years most of us have been concerned about the decrease in mathematical competency of our students. Now that the business community and the colleges are encountering some of our problems they expect us to eliminate the problem in one or two years. It just won't be that easy.

We have "turned off" parents from trying to help their children with their mathematics homework . . . if the student was even given homework. Now we have to convince the parents that we and their children really do need their help.

With the backing of concerned parents and administrators, I hope we can correct the seventh grader who subtracts 49 from 86 and gets a difference of 43, and still feels the enthusiasm of 2000 students participating in mathematics contest on Saturday morning. Confidence is a prerequisite for that type of enthusiasm.

Teachers need confidence and enthusiasm too. The Conference for the Advancement of Mathematics Teaching (CAMT) can supply these for you. I hope to see you in Austin on the 2nd to the 4th of November. Have a lovely summer.

Set Theory In the School Mathematics Program

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The revolution in school mathematics of the 1950's and 1960's placed heavy emphasis on the use of set terminology and concepts. It is now commonplace to find the elements of set theory being used at the very earliest levels of mathematics instruction as a means to clarify and unify the subject matter. Set theory per se has not been a subject of study at the lower levels, but concepts from the theory have generally been used freely when they serve a useful purpose.

Although students are now generally familiar with such notions as set, subset, union, intersection, universal set, complement, equivalence, equality, this was not the case before the fruition of work by various groups during the last two decades. Probably a majority of mathematics teachers are familiar with some of the early set-theoretical results of Georg Cantor, who founded and largely developed set theory during approximately the years 1874-1897. No doubt, a fair number of mathematics teachers are familiar also with some of Cantor's later and deeper results. Mathematics teachers are, therefore, generally well prepared to teach the lower level notions which come from set theory with a minimum of difficulty.

A large number of groups worked on curricular revision during the 1950's and 1960's, with the main work being done during the period 1955-1965. Mathematics and other teachers and parents are aware of the results which have taken place due to the work of these groups whether or not they are familiar with what each group did specifically. The impact on the school mathematics program of such groups as the Commission on Mathematics of the College Entrance Examination Board, the University of Illinois Committee on School Mathematics (UICSM), the University of Maryland Mathematics Project (UMMaP), and the School Mathematics Study Group (SMSG), to mention a few of the better-known and more influential groups, has been tremendous. In addition to these four groups, much credit is due to the very important work done by several other groups, many not as well known as the ones mentioned, which have worked on the problem of curricular revision in mathematics.

The general public seems to think that all the increased emphasis on mathematics and the birth of the "new" mathematics was due to the Russian Sputnik. While this event may have spurred public awareness of the low levels of mathematical competence faced by the nation, it is not fair to view all the curricular and instructional improvement of the last decade or so as a by-product of the post-Sputnik panic. A number of people involved in mathematics at that time were aware of the problem of low levels of mathematical competence nationally. The beginning of the influential study by the Commission on Mathematics and the beginning of work by the

UICSM toward developing materials and training teachers for a new secondary mathematics curriculum which included set concepts antedated Sputnik. The work of the UMMaP got underway in the same year of Sputnik, 1957, and perhaps the most influential group of all, the SMSG, started its work the following year.

The need for curricular revision in mathematics was painfully clear when the early groups started their work. The Commission on Mathematics issued a report in 1959 citing a number of factors entering into the urgent need for curricular revision. A large body of new mathematics has been created just in this century alone, giving rise to specialized journals in areas that were little known to mathematicians a generation ago. Also, there has been reorganization of some of the older mathematics; for example, algebra is now thought of as the study of mathematical structure, or "pattern." A first-year graduate school course in algebra today bears little resemblance to that of forty years ago. The nature of contemporary mathematics is considerably different from the older mathematical point of view. Another important factor mentioned in the report is that there are a vast number of new applications of both the older and the newer mathematics. Besides serving the obvious areas of science and engineering, mathematics is being used increasingly in social science and business. Psychologists, economists, and industrialists make use especially of statistics as well as other advanced mathematical techniques. These and other factors cited by the commission serve to point out the fact that the secondary school mathematics curriculum as it was at that time had lagged behind the growth and uses of mathematics.

The various groups faced quite a task in trying to contribute to the production of a curriculum suitable for students and oriented to the needs of mathematics, natural science, social science, business, technology, and industry in the second half of the twentieth century. The groups are certainly to be commended for making such credit-worthy contributions to curricular reform.

As teachers are aware, the primary change to come about from the considerable work done on curricular and instructional problems was in point of view rather than in the introduction of new topics, although new topics were introduced. Some topics have pretty much been eliminated (for example, deductive solid geometry as a course in itself), and some change in emphasis has taken place (for example, deemphasis of triangle solving in trigonometry and increased emphasis on its analytical aspects). Some shift in emphasis has occurred from mechanical manipulation to the development of concepts.

One fact of great importance that was established by a number of the groups which worked on curricular reform was that mathematics educators and high school teachers can work together with research mathematicians to produce some really significant changes. For a number of years, research mathematicians had pretty much abdicated their responsibilities to the high schools in favor of their own research interests. Today the relationship among high school and college mathematics teachers and research mathematicians is far healthier than it was for a number of years before the work of such groups as the UICSM, the UMMaP, and the SMSG. In a number of universities, it is no longer chic for members of the mathematics department to look down their noses at their colleagues in the mathematics education department. Indeed, the two departments often have extremely good working relationships with each other and mutual respect for the important work of each. It is impossible to overstress the importance of a good relationship between mathematics and mathematics education in continually striving to improve the curriculum and teaching of mathematics.

Help is available to teachers who wonder about with what aspects of set theory they need to be knowledgeable in order to teach more effectively the new curricula. The Panel on Teacher Training of the Committee on the Undergraduate Program in Mathematics (CUPM) has published course guides which contain recommendations as to the training the Panel feels should be adequate and desirable for mathematics teachers. The Panel recommends that the notion of sets, with or without notation, be a part of the course in the structure of the number system for teachers of mathematics in grades K-6. A unit of study on logic and sets is recommended as part of the course work for junior and senior high school mathematics teachers. The impact of the CUPM recomendations is evidenced by the care with which book advertisements and prefaces point out their dependence on these recommendations in writing the texts. The SMSG is also frequently mentioned in advertisements and prefaces. Teachers should have knowledge of the common ideas and fundamental properties of sets. An excellent exposition on set notions with which secondary school mathematics teachers should be familiar is contained in chapter three of the *Twenty-third Yearbook* of the National Council of Teachers of Mathematics.

The foregoing overview will hopefully give some historical perspective to the upheaval which has taken place in recent years in the school mathematics program. The reader who is interested in more detail will find it in the author's *A History of Set Theory,* published by Prindle, Weber, and Schmidt.

The important introduction into lower-level mathematics of set concepts, terminology, and notation is now rather well entrenched. Situations should certainly not be contrived to use sets just for the sake of being "modern," but set notation and terminology should be used when they can serve to clarify and simplify the subject matter. Some of the early integrated college algebra and trigonometry texts were guilty of having a first chapter devoted to sets and then never using the material in the rest of the book. While such a situation is obviously artificial, the judicious use of sets in natural situations has been one of the valuable ingredients of the textual materials of recent years which show, happily, the

heavy influence of the work of the various groups of the 1950's and 1960's.

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Working With The Child Who Has A Physical Disability

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and
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In the past few years, school districts throughout the country have begun to "mainstream" special education children into the regular classroom. In the past, these children were segregated in special education classrooms. Therefore, regular classroom teachers have received little or no instruction about these children. Now that mainstreaming has become a prevalent practice, all teachers must become knowledgeable in various aspects that relate to these children.

Mainstreaming has been initiated for a number of reasons. The stigmatizing effect that a special education classroom has upon an individual has been one commonly cited reason. The children that are mainstreamed are those who can adequately function within the regular classroom. One group of children capable of doing this is that group composed of children with physical disabilities.

As an introduction, a discussion of terminology is in order. Wright (1960) has indicated the importance of terminology as it relates to somatopsychology. On occasion, one may have heard the terms "person with a disability", "disabled person", and "handicapped person". Of these three terms, the first term, "person with a disability" is preferable. This is to emphasize the all-important aspect that the person is first and foremost, a person with many characteristics. The fact that he/she has a disability is secondary. When the terms "disabled person" or "handicapped person" are used, they frequently imply that the person is totally disabled or handicapped. To think this is erroneous. People who have disabilities also have abilities. Although it is tempting to use the short-cut terms, it is important that they not be used because of the devaluation that may be associated with the terms.

Teaching a student with a physical disability is little different from teaching a student who is not physically impaired. The methodology used may not vary at all, but there are other factors that may be considered. These include educational, social, emotional, and psychological aspects, as they relate to the individual.

Physical disabilities may be related to any one of the following ailments: cerebral palsy; poliomyelitis; spina bifida; muscular dystrophy; multiple sclerosis; club foot; scoliosis; bone cysts; accidents; epilepsy; cardiac disorders; allergies; or diabetes.

Any one of the aforementioned maladies may cause several problems for the involved child. Among these may be difficulty with movement, manipulation, and/or balance. Frequently, there may be secondary problems, such as problems in speech, hearing, or with vision. Occasionally, the child may also have related convulsive disorders and/or be emotionally maladjusted. In some cases, the emotional disturbance may be more of a handicapping condition than the physical disability itself.

From the teacher's point of view, one of the most devastating outcomes of physical disability may be educational retardation. This may come about because of frequent hospitalizations or long periods of bedrest, necessitating extended periods of classroom absence. Doctor's visits or inability to concentrate due to fatigue, anxiety, etc. may also be contributing factors.

Given the potential severity of these problems, "How is the classroom teacher of mathematics to proceed?" The purpose of this article is to present some general guidelines for all teachers of students with disabilities, with special emphasis on the mathematics classroom.

First, and foremost, the teacher must be aware of each student's needs. This is especially true with children who have physical disabilities. Contact

with the home, doctors, school nurse, and access to school health records provide the teacher with further insight into a child's special needs. In mathematics especially, this may have importance in terms of homework assignments, enrichment activities, testing programs, and the use of concrete materials.

In the classroom, the child's self-image will be greatly affected by his/her perceptions of others feelings about his/her condition. The mathematics teacher can help in this aspect by the way in which he/she integrates the child into classroom activities. If students in the class see the teacher as having a positive attitude toward the child with a disability, they will more likely be positive toward the child. This positive attitude will be of great help to all concerned. Mathematics may be an academic discipline where the school can be of special help in this area. Many times the class activities in a mathematics classroom will not depend upon physical prowess. Therefore, the teacher can capitalize upon the mental strengths of the child and thus help to build a strong, positive self-concept. These actions will help to counteract the spread phenomenon (the idea that a person with a disability is totally disabled).

Physical disabilities may promote pity from others. Overreaction by teachers and students may cause embarrassment to the child. Children with physical disabilities are not to be pitied; the condition is to be taken into account when planning. Similarly, the student with a disability should not be overprotected. All students should be allowed to work at their own level (each will meet some successes and also some failures). This balance of success and failure is not only important for the student but the teacher as well. He/she will be able to determine if the level of instruction is truly educational.

In a more practical area, the child with a disability may have to use orthopedic appliances such as crutches or a wheelchair. School areas should be designed to offer easy access by all students. The classroom teacher should be knowledgeable about equipment used by his/her students. Storage space for the appliances may be required.

Many times, the teacher of mathematics will employ aids in teaching. Among these will be drawings, constructions, and concrete materials. The teacher must be careful to allow for individual student's differences. The child with a physical disability can be provided with physical activities that will give him/her a sense of accomplishment and success with minimal frustration.

As stated before, the teacher of mathematics may not greatly alter teaching methods in order to integrate a student with a physical disability into the classroom. Yet, there may be unique opportunities to assist the child with the life adjustment process. Important guidelines to be remembered are:

(1) Be up-to-date with each child's individual progress and needs;
(2) Develop a positive attitude;
(3) Make physical adjustments to your classroom;
(4) Do not pity or overprotect the student with a disability; and
(5) Design activities to fit the special needs of your students (i.e. concrete materials, drawings, etc.).

In other words, do for your "special" students, all the things you should already be doing for the entire class.

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