7. Planning career-oriented activities.
8. Keeping students informed about:
   a. secondary school and college mathematics programs
   b. vocational and technical school mathematics requirements
   c. college entrance requirements in mathematics
   d. mathematics requirements for majoring in specific areas
   e. procedures for obtaining college credit for mathematics courses taken in high school
   f. career opportunities in mathematics
   g. mathematics needed for specific fields and professions

Basics in Junior High

by *Bernie Biedron*

Are basics the major emphasis in junior high school mathematics programs today? How well do your junior high students know their basics? How competent are your junior high students with their computations? These are only some of the questions which have rarely been seriously asked in the past ten years in the field of junior high mathematics. I believe it is time that we as junior high school mathematics teachers and for that matter, as mathematics teachers in general, seriously ask ourselves this question, for I believe that the basics are not the major emphasis in junior high school mathematics programs today and they definitely should be. Before proceeding any further, I will define the term basics. As far as I am concerned, basics refers to the basic elementary operations of addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals.

The opinions expressed in this article are based not only upon scientific research but also upon personal experience. I have been teaching junior high school mathematics for the past seven years and I have also taught grades five and six mathematics for a period of four years. I really became concerned and preoccupied with this idea of basics approximately three years ago when I discovered, during the early portion of the school year, that several of my grade seven students had never mastered their three times multiplication table facts. Ever since I have come to believe that, in general, junior high school mathematics students do not know their basics. Stop for one moment and think of any one particular class that you teach and see if you can honestly answer 'no' to each of the following questions. Do any of your students construct mini-multiplication tables and attach them into their mathematics notebooks in inconspicuous places? Do any of your students hesitate, for some time, when they are asked to answer very simple addition or subtraction questions? Do any of your students use fingers to facilitate computation? Now, I could go on and on, but if the answer is 'yes' to any one of these questions, then your mathematics students do not know their basics. Students should learn to become so habituated to the basic elementary operations with numbers that they do not have to think about them. I believe that teachers should do all they can to make the basic elementary operations so habitual that students do not have to think about them any more than they think when they turn on the colour television set.

What is the problem? Why don't students know their basics? Two very good questions. Ever since the '60s, when the new mathematics was first introduced everyone closely involved with mathematics and especially teachers have been overemphasizing such concepts as set theory, groups and fields, combinations, permutations, bases, etc. At the expense of the basics, and let's face it, it is much easier to teach bases than it is to teach the multiplication facts irregardless of the method employed. Secondly, I believe that the mathematical game approach has gone too far. Mathematical games are an asset to any good junior high mathematics program, but they have their place and I say let's keep them there. Dr. Max Beberman, one of the founders of the new mathematics and quite active in it for some twenty years, claims that the students of the new mathematics cannot perform the elementary operations as well as those who were subject to traditional drill. In an article in the 1971 issue of *Mathematics Teaching*, Professor Beberman repediated the entire new mathematics curriculum and was determined to pursue a totally new approach. Professor Edward G. Begle, director of the School Mathematics Study Group (SMSG) admitted that the SMSG curriculum has indeed minimized the acquisiton of the basics.

Dr. Morris Kline, professor of mathematics at New York University, claims that the new mathematics has hurt the teaching of mathematics instead of improving it mainly due to the fact that students do not have a good understanding of the basics. Closer to home, professors of pure and applied mathematics at the University of Manitoba are seriously considering the implementation of a package of basics into the first year mathematics courses. All this means only one thing to me, and that is our students do not know their basics.

What is the solution? What can be done to ensure that basics are the major emphasis in junior high school mathematics programs? Let's begin right here in Manitoba. I believe that we urgently need a master curriculum with the basics and options for each particular grade level K-12 built in, therefore comprising of one complete package. The organization of the master curriculum should involve representatives from every facet of the mathematics education field. This would include, of course, representatives from the Department of Education, universities, community colleges, high schools, junior high schools, and so on. Every school division within the province could then take the master curriculum and adapt it to suit the various needs of that particular school division continuously emphasizing the basics and implementing some of the options as necessary. This would provide for consistency in the teaching of the required basics and it would also provide for uniformity as far as students' standards are concerned. This would also mean that any one school division could virtually administer its own tests on the basic skills and thereby pinpoint the students' weaknesses. Furthermore, the province could also administer a standardized test in order to determine where the students are at as far as the basics are concerned.

I am convinced that a student cannot in any way come to possess a good understanding of the abstract concepts in mathematics -- and I mean any field in mathematics -- unless he or she has the basics at his or her fingertips.

I am also of the opinion that junior high school students should be required to learn the basics in one way or another for there is no future ahead for them if they know only one third or one half of the basics necessary in the high school program. As far as I am concerned, basics were the major emphasis of junior high mathematics, and for that matter mathematics in general, prior to the '60s when the new mathematics was introduced, and were intended to be the major emphasis according to those responsible for initiating the wave of the new mathematics, and always will be the major emphasis in mathematics regardless of the

approach. Yes, basics should be the major emphasis in the junior high school mathematics program and also in any mathematics program at any level for that matter. Incidently, basics are the major emphasis at our school.

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This Skill of Writing Mathematically!

by *Darlene Kidd*
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Before any of us began to write anything, we learned a set of symbols, twenty-six of them called the alphabet. Similarly before we commence to write mathematically we need the tools of the trade, another set of symbols called the numerals, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Just as all words are combinations of the letters of the alphabet so are all numbers combinations of numerals.

Soon we become interested in putting words together to express a thought and thus make a sentence. Mathematical sentences can be made too, but to express a complete thought we need more than just numerals. Other symbols that are important for the composition of number sentences are = ,+, -, x, ÷, >, <, ≠, ≯, ≮. Undoubtedly we could find more as there are alternate methods for expressing multiplication and division, for example, but these mentioned will suffice for our purposes.

Of course, later we are introduced to Algebra and with this introduction comes a need for a new set of symbols in order to make more complex number sentences. We usually adopt the letters of the alphabet as the necessary new symbol but in lower grades you will often notice the use of the □ and the △ and sometimes just the simple ___.

The use of our mathematical symbols usually comes quite easily to young children. Even in the first year of school a child will have no problem telling you that 5 = 5 reads "five equals five." The conversion from a number sentence to a grammatical sentence seems automatic. Similarly the student will easily read 2 + 3 = 5 as "two plus three equals five." Why then the difficulty with problems? Why then the difficulty in converting a "word" sentence to a "number" sentence?

The problem would not appear to be in the symbolism since the child has already shown his ability to recognize symbols. Instead, perhaps, we can discover the area of difficulty by examining some sample problems. Let us examine #1, P. 171 of *Modern Algebra Book 1:* The sum of two consecutive integers is 57. Find the numbers. I agree, a mess of mathematical terminology meaning nothing at first glance! We notice in the first sentence that there are some words of considerably more importance than others. "The" has little importance other than making the sentence sound complete. "Of two consecutive integers" is a prepositional phrase modifying or providing detail about "sum." "Sum" is the subject of the sentence;