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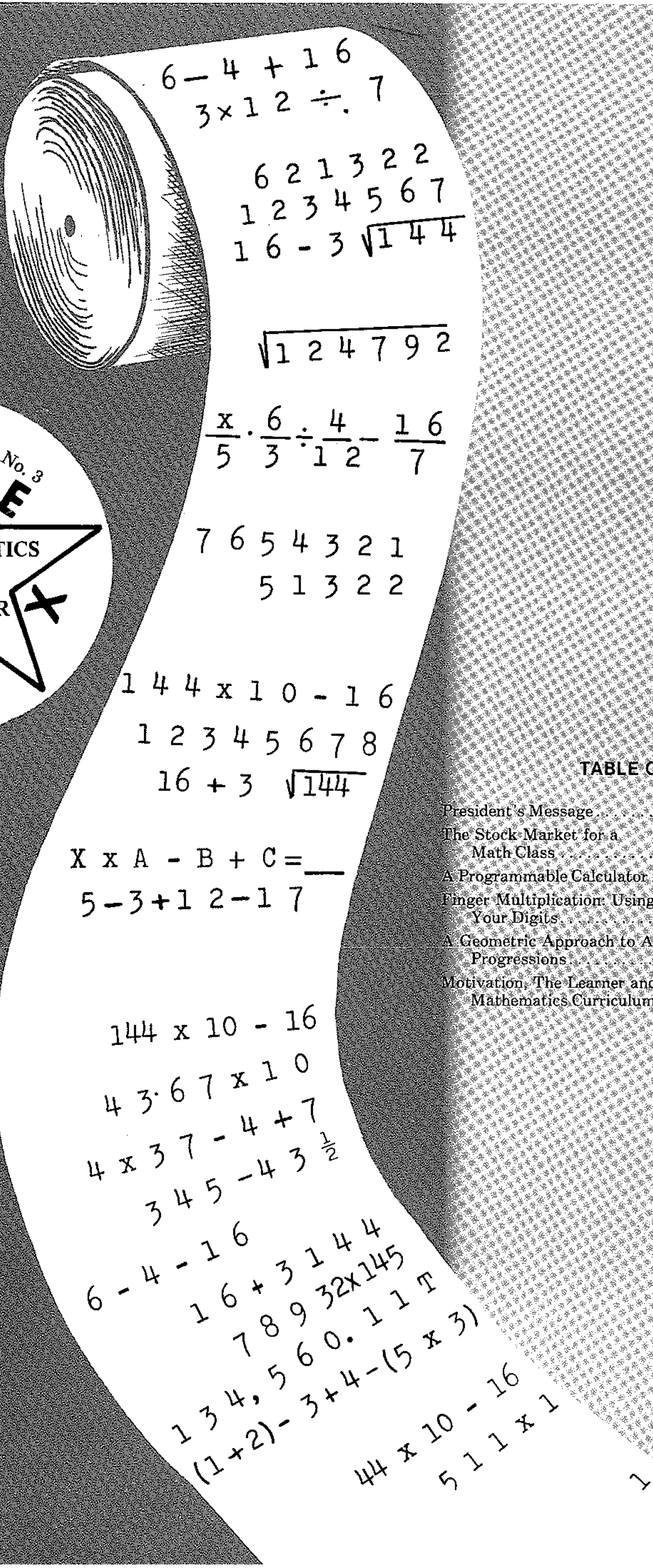
TEXAS MATHEMATICS TEACHER
May 1979



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TEXAS MATHEMATICS TEACHER is the official journal of the Texas Council of Teachers of Mathematics. The views expressed are the contributor's own and are not necessarily those of the publisher or the editor. All manuscripts and correspondence about this publication should be addressed to Mr. J. William Brown, *Texas Mathematics Teacher*, 100 So. Glasgow Drive, Dallas, Texas 75214.

TEXAS MATHEMATICS TEACHER is published quarterly by the Texas Council of Teachers of Mathematics. Payment of membership fee of $5.00 entitles members to all regular Council Publications.

PRESIDENT'S MESSAGE

As the 1978-79 school year draws to a close, I wish to express to each of you my appreciation and congratulations for a job "well-done."

During this year I have attended three very meaningful and relevant meetings for teachers of mathematics: CAMT at Austin in November, 1978, a Name-of-Site meeting in Shreveport, Louisiana, in March, 1979, and the Fifty-seventh annual meeting of NCTM, April, 1979, in Boston, Massachusetts. The program of each of these meetings was well-planned as to topics, speakers, and scheduling. The speakers were competent and shared many practical ideas and suggestions for teachers at all levels. It is my sincere wish that each of you will be privileged to attend some of these kinds of meetings in the future.

The four regional directors of TCTM have been selected. Their names and addresses are listed elsewhere in the journal. These directors will serve for a period of two years, 1979-1981. For them to best serve you, you must communicate with them concerning your needs, suggestions, and questions about TCTM. My thanks to each of you who responded to the call for 'Help' in the January *Texas Mathematics Teacher.*

The following officers are to be elected this year: President-elect, a Vice-president, and Treasurer. The nominating committee with Betty Hall as chairman is in the process of selecting candidates, and you will receive your ballot in August. Please mark your ballot and return it. Our voting record is not at all enviable.

It has been brought to my attention that the names of some TCTM members are not on the mailing list. If you know of anyone who has not been receiving communications from TCTM, tell them to contact the treasurer, Wayne Miller, to make sure their dues were sent in. It is from this list of dues that the mailing list is compiled.

I hope that many of you are making plans to attend both the CAMT in Austin, 25, 26, 27 of October, 1979, and also the NCTM Name-of-Site meeting in Dallas, March 6-8, 1980.

As we close this school year, let us look forward to making next year even better than this one. Have an enjoyable summer!

Anita Priest

The Stock Market for a Math Class?

by David A. Roseland and Sister M. Geralda Schaefer

Pan American University, Edinburg, Texas

The objective of this paper is to describe a unit in mathematics dealing with the stock market. Hopefully, this material could serve the need experienced by many secondary teachers to supplement the textbook with appealing motivational and illustrative applications and to emphasize mathematical thinking in the context of applications.

More specifically, this unit provides the opportunity to apply in a real-life situation knowledge of fractions (halves, fourths, eighths, and sixteenths), conversion of fractions to decimals and percents, as well as the construction and interpretation of line graphs, circle graphs, and bar graphs. This construction involves the use of straight edge, compass, and protractor.

Grade Level: Grades 6–10

Materials: Graph paper, compass, protractor, straight edge.

Procedure:

In order to generate interest in the topic, the instructor will explain activities associated with the stock market and their effect upon the economic situation in the country.

Then each student will bring to class a copy of a newspaper containing a stock market section. To facilitate explanations, it is advisable that all students have the same paper. An alternative: Some newspaper companies will provide sufficient copies for classroom use upon request by the teacher.

First the students will learn how to interpret the stock market information; namely, the names of the companies listed, the number of shares traded for each company, "Sales hds" (Sales in hundreds), the opening price, the closing price, and net change. (Fig. 1)

Company	Sales hds	High	Low	Close	Change
Adam Russl	80	3¼	3	3	−½
AdobeOil	77	11½	11	11½	+3/8
A&EPlas	5	6½	5¾	6¼	+¼

Fig. 1

Next, each student will be allotted $10,000 ± 200 to "purchase" the shares of his choice. In making the selection, the students may seek advice of brokers, parents, or they may decide on the basis of their own study of stock market reports. This last procedure is the most challenging and should be encouraged.

In order to make graphic comparisons of trends in the stock market, it is preferable that each student's portfolio consist of four or more companies and that all the allotted "money" is spent. For uniformity within the class, selections should be made from the same newspaper, buying at the closing price of the day. Also, throughout the unit the daily activity of the purchases should be recorded on the basis of the daily closing price.

For a period of at least four weeks each student will consult the stock market section of the newspaper posted in the classroom and keep a day-to-day chart of the activities of his purchases. This should include the closing price and the number of shares traded. (Fig. 2)

After the data collection is underway, class discussion can lead to decisions concerning appropriate ways to illustrate these data. The following questions can be posed: "What is a good way to illustrate the data so one could determine at a glance how the prices of your shares have fluctuated?", "How can the grand totals be compared daily?", "How can you illustrate the percentage of your portfolio, share-wise and dollar-wise, represented by each company?"

The discussion can be guided to the discovery that the data can be best represented by means of graphs. Illustrative examples can be obtained from such sources as U. S. News and World Report. The class should then agree on the type of graph appropriate for each body of information; namely, the line graph for price fluctuation, bar graph for total shares traded daily, and the circle graph for the percentage each company in a portfolio represents both share-wise and dollar-wise.

Only a small portion of class time will be needed after this project gets underway. Other topics may be pursued simultaneously; however, the students' enthusiasm will overwhelm you. There will be a noticeable change in their attitude towards fractions, decimals, and percent; and, who knows, they may even read something more than the comics!

Students will be required to submit graphs as part of their stock market report. The following which utilize data from Fig. 2 may be used as examples. They have been classroom tested with gratifying results.

1. Line Graph

Using the data from the day-to-day chart (similar to Fig. 2), each student will construct a line graph indicating price fluctuations in stocks for each company. The horizontal axis is labeled "Date"; the vertical axis, "Daily Price". The vertical scale must be adapted to the price range of each company. The title of the graph contains the company name.

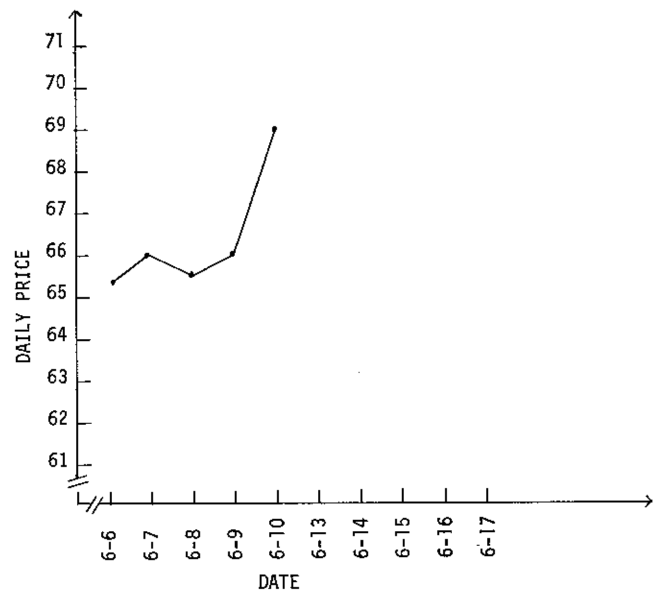


Fig. 3 LINE GRAPH FOR PRICES OF GENERAL MOTORS STOCK

2. Bar Graph

From the data concerning grand total traded on the day-to-day chart (Fig. 2), each student will construct a bar graph. The horizontal axis is labeled, "Date"; the vertical axis, "Total Shares Traded in Hundreds". This total is the grand total of shares traded daily for those companies in the individual portfolios. This information should be charted daily and its significance in decision-making should be explained.

Company	No. of Shares Purchased	Initial Price Per Share	6-6-77*	6-7-77	6-8-77	6-9-77	6-10-77
General Motors	90	67¼	65¼**	66	65½	66	69
			928 ***	1713	1208	1575	1600
Ampex	100	7½	7½	7 5/8	7 3/8	7 5/8	7 7/8
			568	131	252	325	367
American Petrofina	100	31 7/8	31 7/8	31 3/8	31 1/8	31 3/8	32
			22	1	3	9	12
	Grand Total of Shares Traded		1518	1845	1463	1909	1989

*Date Price Quoted
**Price on That Date
***Shares Traded for That Company on That Date in Hundreds

Fig. 2

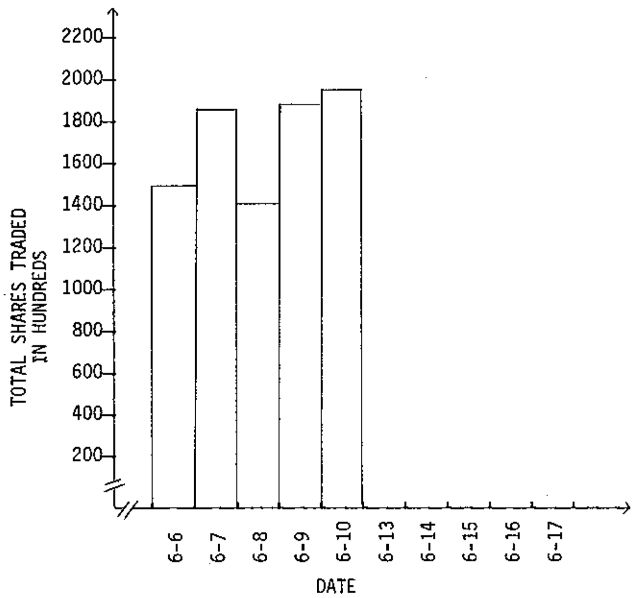


Fig. 4 TOTAL SHARES TRADED DAILY

3. Circle Graph

Each student will be asked to construct one or two circle graphs. The two examples given here show, first, the number of shares of each company in a portfolio relative to the total number of shares purchased; and, secondly, the amount of money invested in each company relative to the total. By constructing these two circle graphs the student will see how information depicted on only one of these could be misleading. A comparison in this example shows that while General Motors constitutes only 31% of the total shares purchased, it accounts for over 60% of the expenditure of available funds.

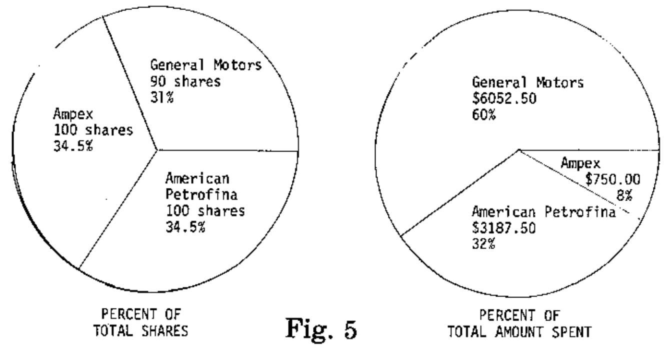


Fig. 5

At the end of the four week period devoted to this unit, each student will sell his shares and determine his loss or gain and the percent of loss or gain on the initial investment. Computing this information can be the culminating activity. The student with the highest gain can be declared the winner and named, "Business Tycoon of the Class".

References

Cobleigh, Ria V. *All About Stocks.* New York: Weybright and Talley, 1970.

Dice, Charles Amos and Wilford John Eiteman. *The Stock Market.* New York: McGraw-Hill Book Co., Inc., 1941.

Finley, Harold M. *Everybody's Guide to the Stock Market.* Chicago: Henry Reguery Co., 1968.

T.C.T.M. MEMBERSHIP

The Texas Council of Teachers of Mathematics has many good things going for any educator who is interested in mathematics education. The Executive Committee has established six worthy goals for us for the next two years. But the Executive Committee and the other elective officers cannot accomplish these goals by themselves. T.C.T.M. needs the support of all of us.

One of our goals is to increase our membership. This is a worthy goal for the simple reason so many mathematics educators are not participating in our programs and services. We, in Texas, are most fortunate in having great mathematics leadership from the Texas Education Agency down to the smallest school district in this state. As a co-sponsor of the C.A.M.T. meeting in Austin each fall, we need to involve many more mathematics teachers.

The fiscal year and the membership year of T.C.T.M. is from September 1 through August 31. This should be to our advantage because teachers have a tendency to join the professional organizations at the beginning of the school year rather than the calendar year. Annual dues for any active member is only five dollars ($5.00). Active membership is available to anyone who is interested in mathematics education.

So, between now and September 1st, invite your math colleagues to join T.C.T.M. along with you. In the South you can afford to be a bit of a missionary. Try spreading the gospel; mathematics, that is.

(Note from editor: Reproduce the membership application form on the back page and pass them to non-members *NOW*!)

FREE METRIC WALL CHARTS

Write today and the large modernized metric system wall chart prepared by the National Bureau of Standards may be in your hands in time for National Metric Week, 7-11 May 1979. These metric wall charts are now available through the U.S. Army Recruiting Command, ATTN: USARCASPMD, Fort Sheridan, IL 60037. Request item RPI-911.

$x = \frac{35}{x} + 2$, A Programmable Calculator Activity[1]

by

Dr. Stephen L. Snover

University of Hartford, West Hartford, CT 06117

and

Dr. Mark A. Spikell

Lesley College, Cambridge, MA 02238

Programmable calculators as well as computers are ideal problem solving tools for secondary students and ideal teaching aids for secondary teachers. In fact, programmable calculators are often better devices for teaching and learning purposes than computers for several reasons including:

1. they now cost so little (a TI 57 is less than $50 and a HP 33 E less than $90) that individuals and schools are increasingly able to afford them;
2. they are small, hand-held and can be operated from rechargeable battery packs for complete portability;
3. they provide instant accesss, there is no waiting for that one, always busy, terminal; and
4. they solve many of the same kinds of problems handled by computers.

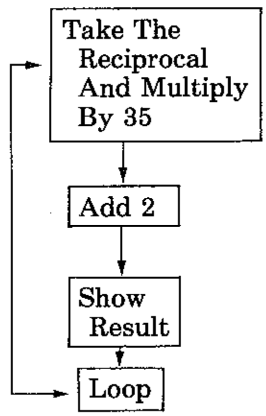
The purpose of this article is to share one problem (activity) which you and your students can explore with a calculator. Importantly, the activity has two key features. First, it is non-standard. That is, it is an activity that would not be easily explored without the use of a programmable calculator. Second, the activity can be used to motivate a discussion of some interesting mathematics as will be noted following the statement of the activity.

The Activity

I. a. Start with any number;
   b. Take the reciprocal and multiply by 35;
   c. Add 2; and
   d. Repeat from step b.

Figures 1 and 2 present flow charts and programs for the TI 57 and HP 33 E programmable calculators, respectively. These machines are chosen as they represent the least expensive models of the two major domestic manufacturers and will likely, therefore, be more widely available than other models.

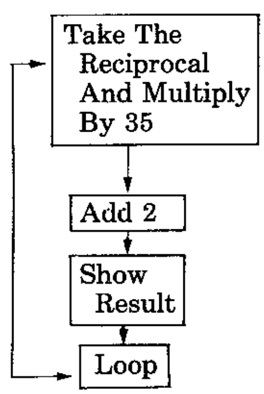
Some relevant questions which might be asked about this particular activity include:




```
00  1/x
01  x
02  3
03  5
04  =
05  +
06  2
07  =
08  2nd Pause
09  RST
```

initialize: RST, enter any number, R/S

Figure 1




```
00  (R/S)
01  g 1/x
02  3
03  5
04  x
05  2
06  +
07  f PAUSE
08  GTO 01
```

initialize: f PRGM, enter any number, R/S

Figure 2

A. For a given starting number, say 9, what happens (to the value in the display) as the number of times through the loop increases?

B. For different positive integer starting numbers what happens (to the value in the display)?

[1]The authors are presenting variations of this activity in several journals in order to invite reader reaction and correspondence about non-standard problems that can be solved with programmable calculators.

C. For a starting number of 0, what happens (to the value in the display)? Are there other integers which give the same result?
D. For different negative integer starting numbers what happens (to the value in the display)?
E. For different non-integer starting numbers what happens (to the value in the display)?
F. For what starting number(s) does the value in the display remain constant?

Analysis

If you explore the activity you will find that for virtually any starting number the value in the display tends to the value 7 as a limit. We like this type of activity because it motivates the need for a technique to convince us that the limit is really what it appears to be, namely, 7.

Interestingly, it is easy to show that the limit of the sequence of numbers in the display is really 7. Think of the limiting value as x, then x has the property that thirty five times its reciprocal plus 2 is itself. That is,

(1) $x=\frac{35}{x}+2$

This equation leads to the quadratic $x^2-2x-35=0$ whose roots are $\frac{2\pm12}{2}$. The positive root $\frac{2+12}{2}$ gives the value 7 which is the limit.

Related Activities

How does one create activities of this type? Since the activity leads to equation (1) which can be rearranged as a quadratic equation, start with a quadratic equation and reverse the process. For example, start with the quadratic $(x-5)(x+3)=0$ and rewrite it as $X^2=2x+15$ and then either take the square root obtaining the equation

(2) $x=\sqrt{2x+15}$

or divide by x obtaining the equation

(3) $x=2+\frac{15}{x}$

Each of these forms suggests a related activity which you and your students can explore.

Equation (2) indicates the activity:

II. a. Start with any number;
b. Multiply by 2 and add 15;
c. Take the square root; and
d. Repeat from step b.

Similarly, equation (3) indicates the additional activity:

III. a. Start with any number;
b. Divide it into 15
c. Add 2; and
d. Repeat from step b.

What happens when you explore these activities? . . . similar activities derived from other quadratic equations? . . . activities derived from other equations such as cubics?

Conclusion

Hand-held programmable calculators offer an inexpensive alternative to computers as a tool for solving a variety of non-standard problems. Much study, research and classroom experimentation is needed to find suitable problems (activities) and ways to use these powerful calculators to enhance the teaching and learning of mathematics at the precollege level. The authors would enjoy corresponding with persons who are using or know of nonstandard problems which can be solved at the secondary level with programmable calculators, particularly the TI 57 and HP 33 E (or their predecessors the TI 56 and HP 25). Please direct any correspondence to Professor Spikell at 20 Pinebrook Road, Wayland, MA 01778.

References

Snover, Stephen L. and Mark A. Spikell. *How To Program Your Programmable Calculator* (Englewood Cliffs: New Jersey, Prentice Hall, Inc., 1979.
———. "Because of Programmable Calculators, Why Avoid These Problems Any Longer," (submitted, January, 1979).
———. "Generally, How Do You Solve Equations?" *Mathematics Teacher* (to appear).
———. "The Role of Programmable Calculators and Computers in Mathematical Proofs," *Mathematics Teacher* 71 (December, 1978):745-750.

"Finger Multiplication: Using All Your Digits"

by Charles E. Lamb

The University of Texas at Austin

In recent years, there has been much said about the use of a child's fingers as he/she computes in arithmetic. These remarks range from the negative, "Don't let them count on their fingers!", to the positive "Let's change our curriculum to wholly coincide with one of the new commercial methods!". Both of these positions seem a little extreme in this author's opinion. A wiser approach for the classroom teacher to follow might be to select instructional approaches in this area in the same way he/she does in other cases. That is, the best method to suit the child's individual needs. It is with this orientation that the present article is written. The idea presented, like all others, will be helpful to some children more than others.

The activity to be illustrated is a common one *** which can be used to compliment instruction on multiplication by 9 in the base ten numeration system. Start by holding up the two hands with fingers extended. (See Figure I)

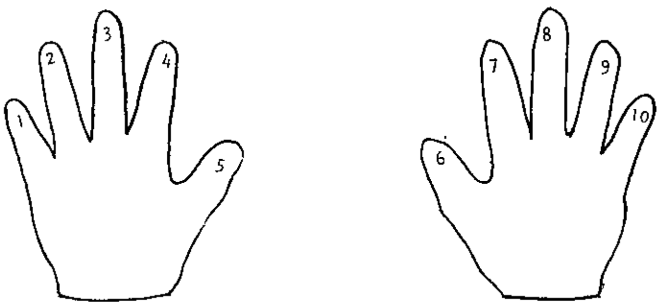


Figure I

Label the fingers as illustrated. After explaining this to the class and making sure that everybody is together, illustrate $6\times9=54$. In order to do this, turn down the finger (labeled 6 (that is the thumb on the right hand). Read the answer, 54, by counting the number of fingers to the left of the turned down finger (namely, 5) and then the number of fingers to the right of the turned down finger (namely, 4). The answer is 54. This method works for 0×9—10×9.

*** I have seen many different variations of this very common "trick" with the fingers. I am unfamiliar with a published reference for it. I would appreciate hearing of any that readers may know of.

In the event a child, jokingly, of course says what if some of your fingers were missing? Consider the case of certain monkeys and apes who don't have thumbs (See Figure II).

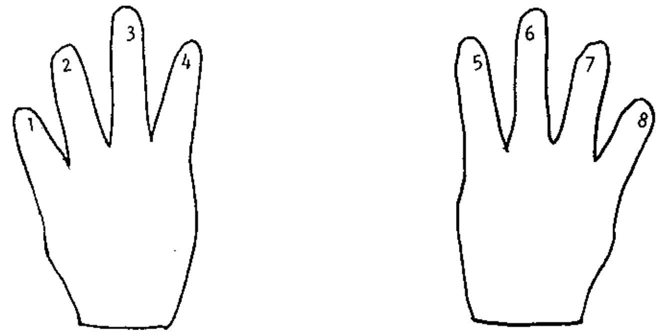


Figure II

Let's change to base eight and do our multiplication by 7. Using the same procedures as before $(3\times7)=25_{eight}$, but $25_{eight}=21_{ten}$. Therefore, things still work out. It is suggested that the base ten method be tried with all children — most will think it's neat and a lot of fun. Other bases might be used as enrichment for appropriate children. Some extension questions might be.

(1) Why does base ten work with multiplication by 9?
(2) Why did we switch to multiplication by 7 with base 8?
(3) Do you think we use base ten because we have ten fingers?
(4) What would happen with nine fingers?

A GEOMETRIC APPROACH TO ARITHMETIC PROGRESSIONS

John Huber

Pan American University, Edinburg, Texas

The story is told that when ten years old and in public school, Gauss's teacher, to occupy the class, had the students add the numbers 1 to 100. Almost immediately Gauss placed his slate on the teacher's desk. After all the slates were turned in, the teacher found that Gauss alone had the correct answer, 5050, but no calculations. [Eves, 370-71.] Gauss had mentally summed the arithmetic progression

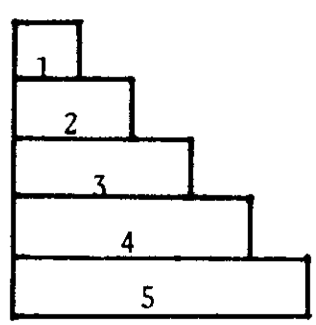
$$1+2+\ldots+99+100$$

by noting that $1+100=101$, $2+99=101$, and so on for 50 such pairs, so

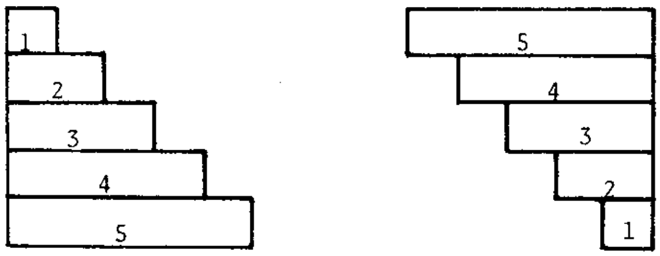
$$1+2+\ldots+99+100=50\times101.$$

It is the purpose of this paper to show this idea can be given a geometric interpretation and then extended to all arithmetic progressions.

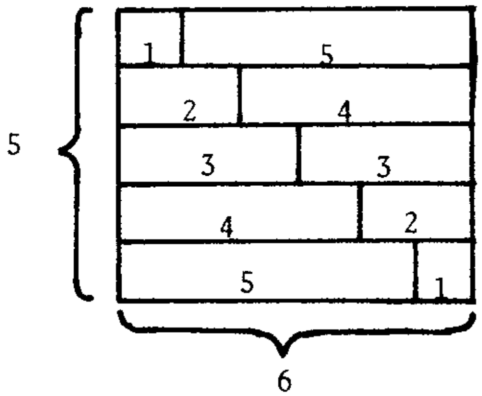
Geometrically $1+2+3+4+5$ can be represented by the area of



Making another copy and rotating it 180° we have



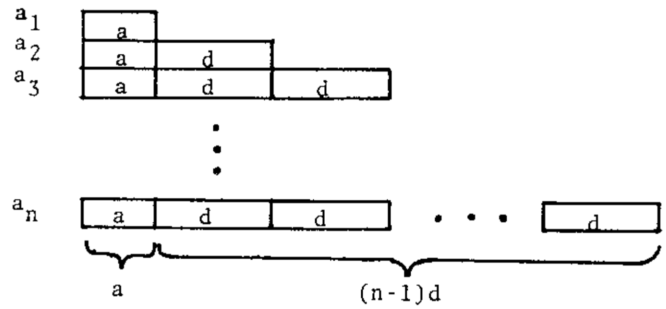
Placing these together we have a rectangle that is 5 by 6. Having



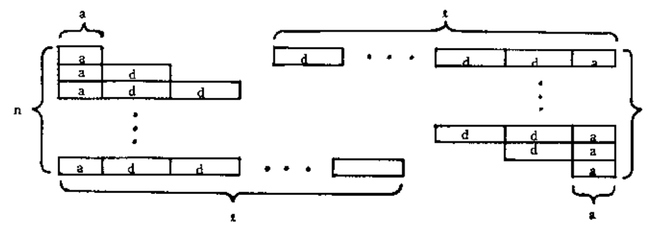
counted the sum $1+2+3+4+5$ twice, we see that $1+2+3+4+5=½(5)(6)$.
Similarly, $1+2+3+\ldots+n$ could be constructed twice forming n by $(n+1)$ rectangle. It then follows that

$1+2+3+\ldots+n=½n(n+1)$.

Now consider an arithmetic sequence $a_1, a_2, \ldots,$ a with the first term $a=a_1$, a common difference a $-$a $=d$, and last term ℓ=a .
Geometrically we can represent this by



where the last term $\ell=[a+(n-1)d]$. Making another copy and rotating 180° we have



Placing these together we have a rectangle that is n by $(a+\ell)$, from which it follows that

$$a+(a+d)+(a+2d)+\ldots+[a+(n-1)d]$$

equals $½n\{a+[a+(n-1)d]\}=\frac{n}{2}(a+\ \ )$.

With this geometric model, the general formulas for the last term and the arithmetic progression can easily be derived. In addition, the student can rely on the model for working problems when he forgets the formulas.

Eves, Howard. *An Introduction to the History of Mathematics* (Fourth Edition), New York: Holt, Rinehart and Winston, 1976.

Announcement:

Spend part of your summer deep in the heart of Texas at the Mo-Ranch near Kerrville attending an outdoor mathematics workshop. Participants will have an exciting week mapping, graphing, collecting data, and creating activities appropriate for use in their own curriculum. The program utilizes an outdoor setting through an integrated subject matter approach. Recreational activities such as canoeing, swimming, hiking, wild life watching, and fishing are at hand. Total daily cost for food and lodging will be under $16. For additional information, contact Dr. Robert K. Gilbert, Division of Education, University of Houston Victoria Campus, Victoria, Texas 77901.

MOTIVATION, THE LEARNER, AND THE MATHEMATICS CURRICULUM

Dr. Marlow Ediger

Northeast Missouri State University, Kirksville

Educational psychologists, curriculum workers, teachers, and administrators have long emphasized the significance of motivating learners to achieve optimally in the mathematics curriculum, as well as in other curricular areas. Mathematics, and arithmetic in particular, has received much emphasis in terms of being one of the three R's (reading, writing, and arithmetic). Thus, mathematics is perceived to be a basic in the school curriculum as well as in the curriculum of life. To achieve well in the basics, pupils need to become motivated learners and thus gain optimal development.

Methods of Motivation

There are diverse methods which teachers may utilize to stimulate pupil learning in the mathematics arena.

Behaviorism, as a school of thought in the psychology of learning, advocates teachers writing measurable objectives in each unit of study. Learning activities may then be chosen which guide learners to attain these relevant ends. Ultimately, after instruction, the teacher may measure learner attainment of the stated objectives.

To motivate pupil achievement in each lesson, the teacher may state in the introduction what learners are to gain specifically within the allotted time devoted to the teaching of mathematics. Pupils may then become enthused in learning that which the teacher stated as an objective or objectives. Thus, for example, in a unit on "Using Decimals and Percent in Our Lives," the teacher may initiate a lesson by stating the precise objective for pupils to achieve: "This morning boys and girls, toward the end of our lesson in mathematics, you will be able to compute the interest due when given the amount of a loan in dollars and the interest rate in percent for borrowing the money." By stating the objective prior to instruction, the teacher orientates the pupils to the new lesson. Learners may then understand what will be required of them toward the close of the lesson in mathematics. Thus, pupils may feel motivated to attain a measurable objective which is known to them prior to participating in related learning activities. Pupils must possess necessary prerequisites to achieve the desired end. Thus, learners may experience success in the school environment which, in and of itself, is motivating to pupils.

Behaviorists also recommend that desired tenets of reinforcement be utilized in teaching to motivate pupil achievement. Thus, for teachers to obtain selected kinds of behavior from pupils, a reward system needs to be implemented. If pupils, for example, respond correctly to answers given in determining the interest due on money borrowed (the principal), the teacher must praise individual learners verbally as well as nonverbally. Material (prizes) or nonmaterial rewards (free time) may also be given for achieving well in the mathematics curriculum.

Humanism, as a school of thought in the psychology of learning, has much to recommend in motivating pupils to achieve well. A. H. Maslow, a humanist, has identified a hierarchy of needs that individuals desire to have fulfilled. The simplest need and yet a very important one pertains to fulfilling physiological needs. Each human being then needs adequate nutrition, rest, clothing, and shelter. Once physiological needs have been met, safety needs must be fulfilled, such as freedom from fear, danger, and insecurity. Additional needs in sequence which need satisfying include love and belonging, esteem, and self-actualization. Individuals are then ready to achieve subject matter learnings in the mathematics curriculum, as well as in other curricular areas. Human beings are motivated to fulfill each of the previously stated needs. The mathematics teacher must realize that learners may be motivated to satisfy physiological, security, love and belonging, esteem, and self actualization needs prior to achieving desired understandings, skills, and attitudes in ongoing units of study in the mathematics curriculum. To be sure, love and belonging, esteem, and self actualization needs can be met partially in a quality mathematics program. Physiological needs, of course, such as proper nutrition and rest must be fulfilled outside of the framework of teaching-learning situations. A. H. Maslow, then, has provided educators with an outstanding hierarchy of needs, which motivate individuals to action for their fulfillment.

Humanists also emphasize the significance of pupils being involved in choosing what to learn and the means of learning. Thus, for example, a learner may select a learning center, among others, to work at as well as specific tasks at the chosen center. Pupils are then engaged in making decisions pertaining to objectives and learning activities. Pupils should also be involved in evaluating their own achievement. Learners may then select that which is perceived to be purposeful, meaningful, as well as interesting in terms of ends, means and evaluation of learning. The teacher is a facilitator of pupil learning and not a dispenser of content. Humanists greatly oppose teachers alone choosing objectives, learning activities, and evaluation procedures for pupils. Learners must be actively involved in choosing ends, means, and evaluation procedures in teaching-learning situations. Motivation is then present within learners when they are involved in choosing and in making decisions.

A third method of motivating learners pertains to the utilization of inductive approaches within the framework of teaching and learning. Learning activities then must be selected to guide pupils to discover related facts, concepts, and generalizations. Learning is its own reward. External rewards are not needed to motivate achievement. Pupil curiosity and interest in solving problems and answering questions may well result in obtaining perceived relevant content. Jerome Bruner, psychologist from Harvard University, has emphasized the importance of pupils achieving structural ideas within a specific academic discipline. Thus, for example, pupils with appropriate learning activities may discover the commutative property of addition and multiplication, the associative property of addition and multiplication, and the distributive property of multiplication over addition. The values inherent in acquiring these structural ideas are their own reward. Learning inductively should then motivate pupil achievement. Discovering facts, concepts, and generalizations is intrinsically rewarding within the framework of teaching-learning situations.

In Summary

Teachers, principals, and supervisors need to study, analyze, and implement desired methods of teaching and learning to motivate pupils. Behaviorists, humanists, and structuralists have principles and theories to recommend in the arena of motivating learner achievement. Educators in the school-class setting should become thoroughly knowledgeable of these diverse schools of thought in the psychology of learning.

Selected References

Bruner, Jerome S. *The Process of Education.* New York: Vintage Books, 1960.

Ediger, Marlow. *Relevancy in the Elementary Curriculum.* Kirksville, Missouri: Simpson Publishing Company, 1975.

Hulse, Stewart H. et. al. *The Psychology of Learning.* New York: McGraw Hill Book Company, 1975.

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