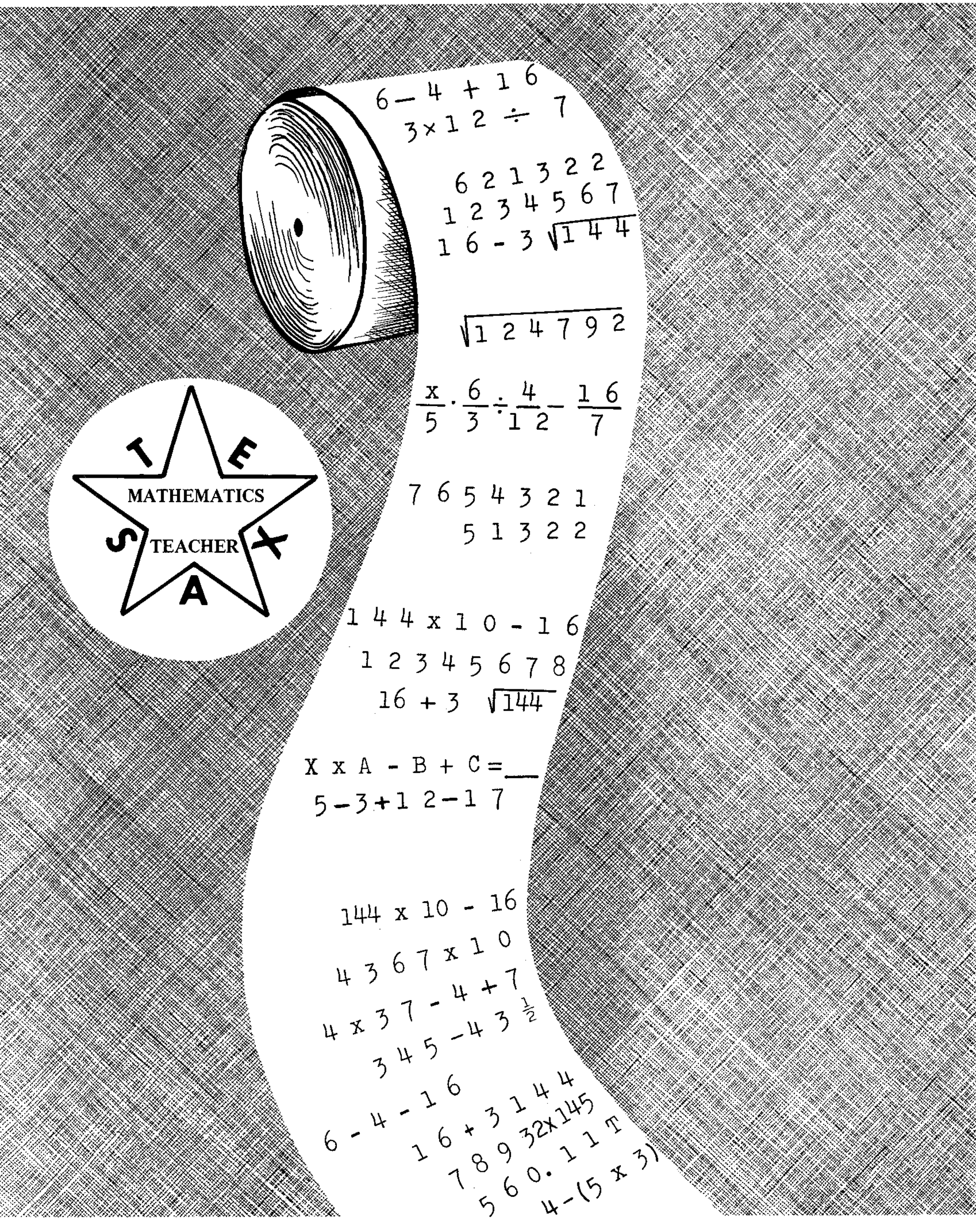
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TEXAS MATHEMATICS TEACHER is the official journal of the Texas Council of Teachers of Mathematics. The views expressed are the contributor's own and are not necessarily those of the publisher or the editor. All manuscripts and correspondence about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



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TEXAS MATHEMATICS TEACHER

Texas Council of Teachers of Mathematics

Vol. XXXI March, 1984 No. 2

## PRESIDENT'S MESSAGE

We seem to be approaching rapidly the close of another school year. Yet there are still several exciting activities going on. I hope you have included the Houston regional meeting of NCTM in your Spring plans, as well as the national meeting of NCTM in San Francisco April 25 – 28. Begin plans now to become involved next year. Contact your regional representative of TCTM if you would like to help with CAMT next October. Plan to attend the Algebra I Conference (former FOM Conference) next year to be held at Sam Houston State University in Huntsville, Texas. Details are being now – so please let us know of your willingness to get involved. Also, manuscripts for the TCTM Journal are solicited – especially from elementary and secondary teachers. We want and need your input. The Math Counts state math contest will be held April 7th in Austin. Any teacher in that area (or anywhere in the state for that matter) willing to help with the grading and proctoring should contact me immediately.

I have listed several ways you could become involved in Mathematcs Education in our state. I hope you respond positively to my call for action.

*Betty Travis*

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## GEOMETRY: LISTENING AND SKETCHING

*David J. Glatzer*
*Director of Mathematics*
*West Orange Public Schools*

The following activity, designed for grades 4–8, provides a way for teachers to focus on geometric concepts and listening skills. The mathematics curriculum in the intermediate and middle school grades typically requires students to learn a great many new terms and concepts, especially from the area of geometry. These terms and concepts need to be reinforced through an ongoing process where students can develop familiarity with the terms and concepts and confidence in using them.

In this activity, students draw quick sketches as they listen to the teacher recite each example. As a result, the student must pay careful attention to the words employed before drawing the sketch. Here are examples for this activity:

1. A right triangle with equal legs.
2. A rectangle where one dimension is approximately twice the other.
3. Two vertical parallel lines.
4. A square formed by joining the midpoings of the sides of another square.
5. An isosceles triangle containing an obtuse angle.
6. An isosceles triangle with vertex angle measuring 10°.
7. A pentagon which looks like a child's drawing of a house.
8. A regular pentagon.
9. Two unequal circles having the same center. (note: This type of example would offer the opportunity to introduce new terminology, concentric circles.)
10. A square inside a circle such that the vertices of the square are on the circle.
11. an equilateral triangle containing an obtuse angle.
12. A circle divided into three equal parts by spokes starting at the center of the circle.
13. Two equal circles having different centers. (note: Here it would be interesting to have students show the different configurations for the given conditions.)
14. Two line segments each perpendicular to a third line segment.
15. A line segment divided into the ratio of 1:1;
16. A line segment divided into the ratio of 1:8.
17. The right triangle formed by a ladder leaning against a building.
18. A "stop sign."

This activity offers a high degree of flexibility regarding actual use in the classroom. The following notes or variations should be considered in order to derive maximum benefit from the activity:

a. This activity can be adjusted for use in different grade levels and with different ability groups. In fact, it can be used for review purposes in high school geometry.
b. Make sure to include examples where the conditions are



(continued on page 4)

# SOME LOGIC OF INDUCTION

Joe T. Allison
Eastfield College, Mesquite, Texas

Texts introduce proofs by induction with equalities having the general appearance:

$$L(1) + L(2) + L(3) + \ldots + L(n) = R(n)$$

or, $\sum_{i=1}^{n} L(i) = R(n)$ along with the phrase "for all integers, $n \geq N$" (N being an arbitory integer, usually one).

For example,

$$1 + 3 + 5 + \ldots + (2n - 1) = n^2 \text{ for all } n \geq 1.$$

The usual claim in present texts is that a proof follows by first showing that the statement of equality holds for an arithmetic choice of n (usually one). Then the statement is assumed true for some unspecified integral choice for n, n = k. Finally, if the patterns hold true for n = k + 1, the proof is concluded.

This method leaves many with feelings of incredulity and a sense of a lack of completeness.

An alternative would be to commence by stating a denial: namely, that the equality holds for only a finite number of integral choices of n.

A demonstration identical to the "old" first step, then, shows that the finite set from which n is being selected is non-empty.

The key statement then commences by saying, under this weakest form of denial, that somewhere up the line, there exists the largest integral choice for n, generally called k, beyond which the equality no longer holds. This k's existence follows from the axiom that any finite set of integers has a greatest member.

The usual second step follows with adjustment:

$$\sum_{i=1}^{K} L(i) = R(k) \quad \text{is true for } n = k \text{ but no higher } n.$$

Step three now expresses that we see what follows if we adjust both sides with the next LEFT-HAND member:

$$\left(\sum_{i=1}^{K} L(i)\right) + L(k+1) \overset{(?)}{=} R(k) + L(k+1) \quad \text{conjecturing}$$

that the questioned equality is false.

However, if the RIGHT-HAND side can now be made to look like R (k + 1), then we have the negation of original denial. That is, instead of there being only a finite number of choices for n, there must be an infinite number of choices.

This method has a couple of advantages. One is psychological in the willingness to accept what follows as "LOGICAL" is palatable. Another is that one gains insight in forms of denials and a psychological desire to have a wieldy "LOGICALLY" weak denial. (Here a distinction is noted between "logic of the psyche" and pure "LOGIC" - the two do not always coincide, alas.)

Finally, a pedagogical admonition for instructors is not to use the sum of the first n positive integers too early. That is, stay away from

$$1 + 2 + 3 + \ldots + n = n(n+1)/2$$

until drills have taken place with examples like:

$$\sum_{i=1}^{n} 1/i(i+1) = n/(n+1),$$

and

$$\sum_{i=1}^{n} 2^i = 2(2^n - 1).$$

## GEOMETRY: LISTENING AND SKETCHING

(Continued from page 3)

contradictory, resulting in no sketch (see example #11).

c. A number of the examples include the idea of approximations. Of course, this should be part of the "ground rules" as students draw sketches.

d. This activity can be used at any time during the school year. It is not necessary to wait for the "geometry unit." As a result, the concepts can be reinforced within a spiral approach.

e. Teachers should not use this activity in the form of a "worksheet." This use would negate the emphasis onlistening skills. However, the sheet may be given to students following the activity for use in connection with the student's notebook.

f. This activity should be considered as a vital part of the "problem solving curriculum." The rationale for this position is based on the importance of diagrams in connection with problem solving strategies.

g. Although the geometric context is presented in this article, it is possible to adapt this activity to numerical situations. For example:
   (i) Write an addition problem with three two-digit even addends.
   (ii) Write a multiplication problem where the two factors are consecutive odd numbers.

h. Additional student involvement might result from having small groups of students responsible for coming up with the examples for this activity.

In summary, this activity offers a different approach to reviewing geometric terms and concepts. Although students might initially see this as a real challenge, it is hoped that ongoing use of the activity would result in having students feel real comfortable with the terms and concepts they are learning.

AMTNJ, Fall, 1983

TCTM Journal needs articles for all levels of Mathematics.

# SOLVING NONLINEAR SYSTEMS OF EQUATIONS

by Bella Wiener
Pan American University

In the typical algebra textbooks (1 – 3) the approach is that the most convenient method of solving a system which contains one or two second-degree equations is by substitution, and that the addition method can be used at times. The substitution method is usually the most useful when one of the equations in a nonlinear system is linear. We solve the linear equation for one of the two variables, then substitute the resulting expression into the nonlinear equation, obtaining an equation of one variable which can be solved.

In this paper we discuss a method which is based on the application of symmetric polynomials. Of course, the substitution method is rather general. Theoretically, it is possible to eliminante one variable from any system of two algebraic equations with two unknowns and to obtain an equation for the other variable. However, the process of elimination is not always simple. And what is more essential, the greatest inconvenience of the substitution method is that it often leads to an equation of very high degree. Indeed, if in a system of two equations with two unknowns one equation is of degree m and the other is of degree n, then after the substitution the resulting equation is, as a rule, of degree mn. Because of these deficiencies the substitution method is used very seldom to solve systems of higher degree equations.

The approach based on the theory of symmetric polynomials offers a quite general method of solving higher degree systems. It is not as universal as the substitution method since it cannot be applied to every system. But this method is suitable for many systems encountered by a student. It is very important that, unlike the substitution method, the theory of symmetry brings not to the rise but to the reduction in the power of the equations. Furthermore, this theory is simple and allows to solve not only many systems of algebraic equations, but also various other algebraic problems (solving irrational equations, proving identities and inequalities, factoring, rationalizing denominators, etc.). Here we restrict ourselves to systems of two equations with two unknowns. Therefore, our treatment of the problem is based on the use of the well-known Vieta formulas

$$x_1 + x_2 = p, \quad x_1 x_2 = q$$

for the sum and product of the roots $x_1$ and $x_2$ of the quadratic equation $x^2 - pz + q = 0$. Certainly, these relations represent a mere consequence of the quadratic formula. Nonetheless, it has been shown that, conversely, the Vieta formulas can be used to obtain the quadratic formula, that is, to solve the quadratic equation. It is the purpose of this note to discuss the Vieta formulas from a different viewpoint and to apply them to the study of systems

$$P(x, y) = a, \quad Q(x, y) = b$$

with symmetric polynomials $P(x, y)$ and $Q(x, y)$. Polynomials are called symmetric, if they contain x and y in the same manner. More precisely, a polynomial is said to be symmetric, if it does not change when x is replaced by y and y by x. Hence, if $P(x, y)$ is symmetric, then

$$P(x, y) = P(y, x).$$

Thus, the polynomial $x^2 y + x y^2$ is symmetric. On the contrary, the polynomial $x^3 - 3y^2$ is not symmetric, for the interchange of x and y turns it into the polynomial $y^3 - 3x^2$ which does not coincide with the original. Now, we list the most important examples of symmetric polynomials. The commutative axioms of addition and multiplication state that

$$x + y = y + x, \quad xy = yx.$$

The symmetric polynomials

$$p = x + y, \quad q = xy \qquad (1)$$

are the simplest. They are called elementary symmetric polynomials in x and y. Besides, we often encounter the so called power sums, that is, polynomials

$$x^2 + y^2, \ x^3 + y^3, \ldots, \ x^n + y^n, \ldots$$

It is customary to denote the polynomial

$$x^n + y^n \text{ by } s_n.$$

Thus,

$$s_1 = x + y, \ s_2 = x^2 + y^2, \ s_3 = x^3 + y^3, \ s_4 = x^4 + y^4, \ldots$$

Any symmetric polynomial of x and y can be represented as a polynomial of $p = x + y$ and $q = xy$. In particular, it is not difficult to find for the power sums $s_1$, $s_2$, $s_3$, $s_4$ their expressions in p and q:

$$\begin{aligned}
s_1 &= x + y = p, \\
s_2 &= x^2 + y^2 = (x + y)^2 - 2xy = p^2 - 2q, \qquad (2) \\
s_3 &= x^3 + y^3 = (x + y)^3 - 3(x + y)xy = p(p^2 - 3q), \\
s_4 &= x^4 + y^4 = (x^2 + y^2)^2 - 2x^2 y^2 = (p^2 - 2q)^2 - 2q^2.
\end{aligned}$$

These results can be used to solve different systems of algebraic equations. As we already mentioned, we very often encounter such systems of equations. As we already mentioned, we very often encounter such systems of equations, the left-hand sides of which depend symmetrically on the unknowns x and y. In this case, it is always possible and convenient to pass to new variables $p = x + y$ and $q = xy$. The advantage of this change of variables lies in the fact that the powers of the equations decrease after the substitution, since $q = xy$ is a polynomial of the second degree in x, y. In other words, usually it is easier to solve the system relative to the new unknowns p and q rather than the original system. After the values of p and q are found, it is necessary to determine the values of the original unknowns x and y. This can be done easily by resorting to the following theorem which is cited in various elementary algebra sources.

Theorem. Let p and q be any two numbers. The quadratic equation

$$z^2 - pz + q = 0 \qquad (3)$$

and the system of equations

$$\begin{aligned} x + y &= p \qquad (4) \\ xy &= q \end{aligned}$$

are related to each other in the following way. If $z_1$ and $z_2$ are the roots of equation (3), then system (4) has two solutions

$$x = z_1, \ y = z_2 \ \text{ and } \ x = z_2, \ y = z_1,$$

and has no solutions. Conversely, if $x = c$, $y = d$ is a solution of system (4), then the numbers c and d are the roots of equation (3).

Example 1. Solve the system of equations

$$\begin{aligned} x + xy + y &= 11 \\ x^2 y + x y^2 &= 30 \end{aligned}$$

Solution. Since the left-hand sides of both equations are symmetric polynomials of x and y, the substitutions (1) change the given system to the form $p + q = 11$, $pq = 30$. using the Theorem we write the quadratic equation $z^2 - 11z + 30 = 0$, the roots $z_1 = 5$, $z_2 = 6$ of which are easily found by factoring. Therefore, we have two solutions for p and q:

$$p_1 = 5, q_1 = 6 \text{ and } p_2 = 6, \quad q_2 = 5.$$

it remains to solve two quadratic equations

$$z^2 - 5z + 6 = 0 \text{ and } z^2 - 6z + 5 = 0.$$

The roots of the first are $z_1 = 2$, $z_2 = 3$ and the roots of the second are $z_1 = 1$, $z_2 = 5$. From here we conclude that the original system has the following 4 solutions:

$$x_1 = 2,\ y_1 = 3;\ x_2 = 3,\ y_2 = 2;\ x_3 = 1,\ y_3 = 5,\ x_4 = 5, y_4 = 1$$

Example 2. To solve the system

$$x^4 + y^4 = 17$$

$$x + y = 3,$$

we make the substitutions (1) and use the last of formulas (2) for the power sum $s_4 = x^4 + y^4$. This gives a new system

$$(p^2 - 2q)^2 - 2q^2 = 17$$

$$p = 3$$

for the unknowns p and q. We substitute $p = 3$ in the first equation and obtain $q^2 - 18q + 32 = 0$. The roots of this equation are $q_1 = 2$, $q_2 = 16$. Hence, we have two solutions:

$$p_1 = 3,\ q_1 = 2;\ p_2 = 3,\ q_2 = 16.$$

We take the quadratic equations $z^2 - 3z + 2 = 0$ and $z^2 - 3z + 16 = 0$ and find their respective roots

$$z_1 = 1,\ z_2 = 2 \text{ and } z_1 = \frac{3 + i\sqrt{55}}{2},$$

$$z_2 = \frac{3 - i\sqrt{55}}{2}$$

Thus, the given system has 4 solutions

$$x_1 = 1,\ y_1 = 2;\ x_2 = 2, y_2 = 1;\ x_3 = \frac{3 + i\sqrt{55}}{2},$$

$$y_3 = \frac{3 - i\sqrt{55}}{2}, \quad x_4 = \frac{3 - i\sqrt{55}}{2},$$

$$y_4 = \frac{3 + i\sqrt{55}}{2}.$$

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# ADOPTING A NEW MATHEMATICS TEXTBOOK SERIES? INVESTIGATE READABILITY LEVELS BEFORE YOU BUY!

*by Nina L. Ronshausen*
Texas Tech University

According to one study, 93% of elementary grades teachers base their mathematics lessons on the mathematics textbook. Despite the teachers' best efforts, they find that most children do not read the texbook; they only copy the assigned exercises from it. Several reasons for that behavior have been suggested; certainly one difficulty is that, due to unsuitable readability levels, many children **cannot** read their mathematics textbooks. **Background Information.**

As a course assignment, a Texas Tech student used Fry's Readability Graph to estimate the readability of the fifth grade textbook in five mathematics publishers' series. Following Fry's directions for using the Graph, the student determined that readability levels of the fifth grade textbooks ranged from mid – fourth grade to mid – seventh grade.

Because of those findings, the author decided to examine the readability levels for grades one – six mathematics textbook series from eight publishers, including all of the state-adopted series. An adaptation of Fry's instructions for Fry's Readability Graph was used. In this adaptation, text selections containing mathematics vocabulary and/or symbols were not omitted. Further, mathematics voacabulary and symbols were **read abloud for their meaning in a mathematical context.** Thus, 432 is read aloud as **four hundred thirty-two** (one word, six syllables) rather than as **four-three-two** (one word, three syllables, as recommended by Fry). This method appears to be more realistic but it does result in somewhat higher readability levels than would be obtaining by following Fry's instructions explicitly. The reader should note that, as yet, no research results have been reported which confirm the author's opinion as to the efficacy of this adaptation of Fry's procedures.

A wide range in readability levels at each nominal grade level was noted using the adapted procedures. For example, there was a four – grade range in nominally sixth grade textbooks and a two – grade range in nominally first grade textbooks. Second, only one publisher's series had readability levels consistently below the nominal grade level (and they were well below, which is significant since the adapted procedures tend to raise the readability level). Third, most textbook series had a pattern of readability levels increasing consistently from one nominal grade level to the next but three series exhibited **inversions,** i. e., a readability level much higher than nominal grade level followed by lower readability levels for subsequent grade levels. Fourth, some series showed considerable variation in readability levels within a grade level, so that the average readability level of the textbook appears to be reasonable in comparison to that of competitive textbook series, yet many parts of the textbook could be read only by the best readers in the classroom.

**SUGGESTIONS**

First, make readability level one of the criteria for selecting a math textbook series. If possible, select a series in which readability level is consistently below the nominal grade level and a series in which readability level is fairly consistent within each textbook.

Second, encourage the Texas Education Agency to include readability level as one of its criteria when it prepares Proclamations to Publishers in future rounds of mathematics textbook adoptions at the state level.

Third, when investigating readability level, consider using the adaptation of Fry's Readability Graph presented here so that the effects of mathematics vocabulary and symbols can be estimated. Since research results are not yet available to establish the relationship of grade level to syllables and words in mathematics sentences, use the resulting data to detect patterns in readability levels and to make comparisons among textbooks rather than to establish absolute readability levels.

Fourth, if a textbook has a readability level which is too high and another textbook cannot be substituted, consider rewriting the most important explanations, directions and/or stated problems so that learners can read them. Also, teach the children to sight read the words and phrases that will be new to them ( do this about two weeks before teaching the math lesson containing the words). Plan to have some oral reading sessions (perhaps in an extended reading-plus-math lesson) so that children learn to say long number names, number sentences (including fractions and decimals, if they appear in the textbook), geometry symbols and formulas (if they're in the textbook). The classroom teacher may also encourage children to read easy non-textbook math materials. The children's section of the local public library can provide delightful trade books on math topics which can be made available in the classroom for free reading. Reading books like **A Kiss Is Round, Zero Is Not Nothing and Arithmetic for Billy Goats** is also an excellent "sponge" activity for children who complete assigned tasks early.

**MANUSCRIPTS NEEDED!!!!! Send them to 100 S. Glasgow, Dallas, Texas, 75214.**

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Mathematics Department, Texas Education Agency

# ACADEMIC PREPARATION FOR COLLEGE

*Office of Academic Affairs*
*The College Board*
*New York, NY*

This is the text of the mathematics statement that appears in Chapter IV of the booklet **Academic Preparation for College — What Students Need to Know and Be Able To Do.** This booklet was developed as part of The College Board's Educational EQuality Project. It contains a comprehensive statement about the academic preparation secondary students need in six subjects — English, the arts, mathematics, science, social studies, and foreign language — in order to succeed in college. The purpose of the Project is to increase the supply of well trained students.

## MATHEMATICS

### Why?

All people need some knowledge of mathematics to function well in today's society. Mathematics is an indispensable language of science and technology, as well as business and finance. All people, therefore, need some fluency in this language if they are to contribute to and fare well in our contemporary world.

More than at any time in the past the knowledge and appreciation of mathematics is essential to students' intellectual development. The advances of recent years in computer science and other highly technical fields such as space science have opened new horizons to those trained in mathematics. Young people who avail themselves of the opportunity to gain strong preparation in mathematics and in the sciences not only will grow intellectually but also keep open the door to a wide range of career choices.

Students going to college need mathematical skills beyond the elementary ones. They need a knowledge of computing to deal with the new age of computers and information systems. They need a knowledge of algebra, geometry, and functions to major in a wide range of fields, from archaeology to zoology. They need a knowledge of statistics for such fields as business, psychology, and economics.

More extensive knowledge and skills, including preparation for calculus, will be needed by college entrants who expect to take advanced mathematics courses or to major in such fields as engineering, economics, premedicine, computer science, or the natural sciences.

### What?

The following learning outcomes in some cases provide greater detail concerning the Baisc Academic Competency in mathematics outlined in Chapter II and the computer competency described in Chapter III, but in other cases go beyond the competencies to specify further outcomes of the study of mathematics. College entrants will need the following basic mathematical proficiency.

- The ability to apply mathematical techniques in the solution of real-life problems and to recognize when to apply those techniques.
- Familiarity with the language, notation, and deductive nature of mathematics and the ability to express quantitative ideas with precision.
- The ability to use computers and calculators.
- Familiarity with the basic concepts of statistics and statistical reasoning.
- Knowledge in considerable depth and detail of algebra, geometry, and functions. More specifically, college entrants will need the following preparation in mathematics.

**Computing**
- Familiarity with computer programming and the use of prepared computer programs in mathematics.
- The ability to use mental computation and estimation to evaluate calculator and computer results.
- Familiarity with the methods used to solve mathematical problems when calculators or computers are the tools.

**Statistics**
- The ability to gather and interpret data and to represent them graphically.
- The ability to apply techniques for summarizing data using such statistical concepts as average, median, and mode.
- Familiarity with techniques of statistical reasoning and common misuses of statistics.

**Algebra**
- Skill in solving equations and inequalitites.
- Skill in operations with real numbers.
- Skill in simplifying algebraic expressions, including simple rational and radical expressions.
- Familiarity with permutations, combinations, simple counting problems, and the binomial theorem.

**Geometry**
- Knowledge of two — and three—dimensional figures and their properties.
- The ability to think of tow— and three—dimensional figures in terms of symmetry, congruence, and similarity.
- The ability to use the Pythagorean theorem and special right triangle relationships.
- The ability to draw geometrical figures and use geometrical modes of thinking in the solving of problems.

**Functions**
- Knowledge of relations, functions, and inverses.
- The ability to graph linear and quadratic functions and use them in the interpretation and solution of problems.

*College entrants expecting to major in science or engineering or to take advanced courses in mathematics or computer science will need the following more extensive mathematical proficiency.*

**Computing**
- *The ability to write computer programs to solve a variety of mathematical problems.*
- *Familiarity with the methodology of developing computer programs and with the considerations of design, structure, and style that are an important part of this methodology.*

**Statistics**
- *Understanding of simulation techniques used to model experimental situations.*
- *Knowledge of elementary concepts of probability needed in the study and understanding of statistics.*

**Algebra**

- *Skill in solving trigonometric, exponential and logarithmic equations.*
- *Skill in operations with complex numbers.*
- *Familiarity with arithmetic and geometric series and with proofs by mathematical induction.*
- *Familiarity with simple matrix operations and their relation to systems of linear equations.*

**Geometry**

- *Appreciation of the role of proofs and axiomatic structure in mathematics and the ability to write proofs.*
- *Knowledge of the conic sections.*
- *Knowledge of analytic geometry in the plane.*
- *Familiarity with vectors and with the use of polar coordinates.*

**Functions**

- *Knowledge of various types of functions including polynomial, exponential, logarithmic, and circular functions.*
- *The ability to graph such functions and to use them in the solution of problems.*

Other references to mathematics appear in the science statement in Chapter IV. Chapter II, "The Basic Academic Competencies," contains a list of desired mathematics competencies; and Chapter V, "Achieving the Outcomes," suggests ways of incorporating the EQuality project's ideas into existing curriculums.

For a copy of the Booklet or for more information about the Educational EQuality Project, write to the Office of Academic Affairs, The College Board, 888 Seventh Avenue, New York, New York 10106.



*AMTNJ, Fall, 1983*

# ICME 5
## August 24-30, 1984
## Adelaide, Australia

The ICME 5 Organizing Committee is pleased to announce that the Fifth International Congress on Mathematical Education will be held in Adelaide from August 24 to 30, 1984.

The ICME invites you to participate in this Congress. The Formal Program, informal meetings and social events will offer many opportunities to develop personal contacts for the dissemination of information and ideas relevant to current problems and interests of mathematical education.

ICME is pleased to appoint the firm of Travel Planners, Inc., located in San Antonio, Texas as the official housing and travel coordinator for Congress delegates. Travel Planners will facilitate your registration – offering air reservations and ticketing, housing, sightseeing, exciting Pre-Congress trips - all through one central office. You will have the advantage of prompt communication within the U.S. for all of your requirements.

## Formal Program

The Program will cover all areas of education and the diverse needs and interests of the participants. Congress activities will include lectures, seminars, workshops, films, poster sessions and exhibitions of current Projects in mathematical education. Special Interest, Working and Study Groups are invited to meet and to contribute to the Congress Program. A large exhibition of aids and materials relevant to mathematical education and research is planned to be held in conjunction with the Congress. The Congress Venue is the University of Adelaide, whose compact campus is a few minutes' walk from the center of Adelaide – a city of 800,000 people.

Social activities will be included in the Congress program. In addition, a program of activities, arranged for those not participating in the Formal Program, will be available to visitors registering as Accompanying Members of the Congress.

## Selected Pre-Congress Tours For North Americans

Exclusive Pre-Congress tours have been developed, which will allow delegates to return to the U.S. by September 1 or 2. Visit the beautiful cities of Sydney and Melbourne. Or take the exciting tour of New Zealand and Australia, visiting such cities as Christchurch, Queenstown, Auckland, and Sydney.

## Air Fare

Special West Coast USA to Adelaide air fares of between $974.00 and $1,389.00 (depending on itinerary) will be available through Travel Planners — affording delegates a potential savings of 40% to 50% over all-year tourist fares of approximately $2,651.00. Stopovers in Honolulu are also available, and will be outlined in the Official Brochure. (Fares quoted are in effect as of 8/1/83, and are subject to change.)

All of the above programs, as well as important information on the Congress and the necessary registration/reservation forms, will be included in the OFFICIAL FIFTH INTERNATIONAL CONGRESS ON MATHEMATICAL EDUCATION BROCHURE. To request the brochure:

ICME 5 TRAVEL PLANNERS
P.O. Box 32366
San Antonio, Texas 78216
Phone: (512) 341-8131

# News Release

UTSA SUMMER INSTITUTE OFFERS COURSES FOR EDUCATORS

March 15, 1984

Contact: Megan Mastal
(512) 691-4550

Working professionals can earn graduate credit while brushing up on teaching skills and expanding their knowledge at the 1984 Summer Institute at The University of Texas at San Antonio.

Currently in its fifth year, the Institute offers graduate level courses in a short-term, intensive format. The courses are designed to meet the specific needs of educators and other professionals and are available at a time when they can conveniently return to campus.

Leading scholars from throughout the country will join resident UTSA faculty members to present The University's Summer Institute.

Participants may choose courses in anthropology, history, mathematics and computer sciences, educational management, curriculum and instruction, criminal justice, early childhood and elementary education, educational psychology, bicultural-bilingual studies and music.

Classes meet from one to three weeks and offer from one to three graduate credit hours which can be applied to degree programs and certification requirements.

Students who file an application on or before May 1 will be able to register by mail. Those who file after May 1 must attend regular registration on May 31 or July 9. For additional admission or registration information, contact the Office of Admissions and Registrar, The University of Texas at San Antonio, San Antonio, Texas, 78285, (512) 691-4532.

# PLEASE SOLICIT NEW MEMBERSHIPS!

## PROFESSIONAL MEMBERSHIP APPLICATION

Date: ______ School: ______ School Address: ______

Position: ☐ teacher, ☐ department head, ☐ supervisor, ☐ student,* ☐ other (specify) ______

Level: ☐ elementary, ☐ junior high school, ☐ high school, ☐ junior college, ☐ college, ☐ other (specify ______

Other information ______

| | | *Amount Paid* |
|---|---|---|
| Texas Council of Teachers of Mathematics | ☐ New membership<br>☐ Renewal membership | 5.00 |
| Local ORGANIZATION: ______ | ☐ New membership<br>☐ Renewal membership | |
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| *National Council of Teachers of Mathematics* | Check one: ☐ New membership ☐ Renewal membership | |
| | $30.00 dues and one journal ☐ Arithmetic Teacher or ☐ Mathematics Teacher | |
| | $40.00 dues and both journals | |
| | $15.00 student dues and one journal* ☐ Arithmetic Teacher or ☐ Mathematics Teacher | |
| | $20.00 student dues and both journals* | *Note New Membership and Subscription Fees* |
| | 12.00 additional for subscription to *Journal for Research in Mathematics Education* (NCTM members only) | |
| | The membership dues payment includes $10.00 for a subscription to either the *Mathematics Teacher* or the *Arithmetic Teacher* and 75¢ for a subscription to the *Newsletter*. Life membership and institutional subscription information available on request from the Reston office. | |
| *I certify that I have never taught professionally ______ *(Student Signature)* | *Enclose One Check for Total Amount Due* → | |

Fill out, and mail to Mrs. Bettye Hall, 3830 Richmond, Houston, Texas 77027

**NOW!**


**TEXAS MATHEMATICS TEACHER**
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