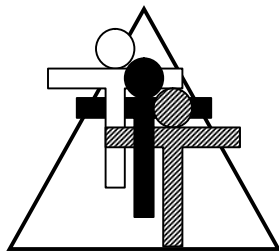


High Performing Teachers Make High Performing Students

A Resource Manual for Teachers and Administrators

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Teacher to Teacher Press

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High Performing Teachers Make High Performing Students

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* * * * *

Collaborative Time

Use this time to reflect on the material presented, share with your neighbors, and think about how to refine and improve your teaching practices

A Note from Brad and Bill

Teacher to Teacher Press produces curriculum written by teachers, to teachers, and for students. We know how busy you are. In addition to the literally hundreds of duties and responsibilities you already have, you may be teaching a class without a good textbook or other source of curriculum. You simply don't have the time to find all the material you need. That's where we hope to help.

Our books are based on specific and important goals that we think you'll appreciate. First of all, we are schoolteachers. We know first hand that many texts and units are either too symbolic or solely concrete and manipulatively based. Students are in transition as they learn. They learn from concrete experiences, but they are capable of moving into the abstract. All of our materials are designed to help them make a successful transition.

Secondly, we believe that the N.C.T.M. Standards are filled with great ideas. Now it is up to those of us in the field to develop curriculum to meet these great standards.

Thirdly, we know that your time is precious. You have much to teach and only 180 days or so to do the job. Your students need more experience with a new subject than the two-page spread offered by the typical textbook. At the same time, you can't afford to spend six weeks on a unit that only covers a single topic. That is why our activities are designed to take shorter periods of time or to be broken up into smaller increments of time. Sure, you can spend more time on an activity or unit if you have some spare days, and your students want it—we offer plenty of extensions—but our activities are designed to be finished before your students become bored.

Lastly, you didn't go to college to spend your life in front of a copy machine, or to chase down the obscure supplies required for teaching some units. That is why our units and their materials lists are simple. We teach what we write, and if it isn't simple and effective, we find something that is.

If you are interested in our other units, books, materials, workshops or inservices, you may contact the authors at this address:

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Brad and Bill

Abstract

We want teachers to be models of mathematical reasoning and problem solving. By providing teachers with the proper tools, they can build the confidence and abilities of their students.

They can check for understanding, provide for collective and collaborative thinking, problem solving, and reflections.

Using simple activities that can be modified for use in any grade, teachers can develop deep concepts of mathematics in number sense, algebraic thinking, and geometry. The activities lead naturally into extensions, providing use of these activities over several months, and allowing students to become competent and confident in their skills.

The comprehensive handout will enable all participants to become experts at communicating essential skills and will enable math leaders and trainers to inservice their staffs.

Mathemagics and the Teacher

Effective teachers perform mathematical feats of strength, skill, and magic on a daily basis. They:

- ✓ Are enthusiastic
- ✓ Control their students
- ✓ Are skilled presenters
- ✓ Have a sense of humor
- ✓ Think on their feet and improvise

This helps them:

- ✓ Reduce math anxiety
- ✓ Teach problem-solving skills
- ✓ Include recreational mathematics
- ✓ Help kids appreciate and enjoy math
- ✓ Illustrate math concepts in exciting ways

Fourteen Factors of a Successful Algebra Program

Many factors go into creating a successful program for preparing students for 8th grade algebra. Here are ones we feel have contributed to the success of our program. While you may decide that some of these strategies may not work at your site, the more of them you implement, the more positive results you should see. You may be able to put into practice your own ideas which are not on this list.

1. Expose as many of your 8th graders as possible to an algebra program in the 8th grade. Include English Language Learners and resource students. When in doubt as to whether students are ready to take algebra, let them try the course.

Fourteen Factors of a Successful Algebra Program

2. For students who require more support, avoid pull-out programs. All remediation should be *in addition to* not *in place of* regular instruction. Dovetail intervention classes to support the instruction of the regular algebra program.

3. Use collaborative time to develop continuity among grade levels for algebraic instruction. Use common vocabulary, strategies, and teaching techniques to avoid students having to memorize extraneous information. For example, how do you teach students to approach solving equations?

Fourteen Factors of a Successful Algebra Program

4. Begin early with preteaching of concepts. Encourage teachers to look at the standards their students learned in prior years and will face in subsequent years. How can we use what students have already learned to lay the foundation for these future skills?

5. Teach algebra concepts to all 8th graders. Teach the rigor of Algebra 1 to the students who are ready for the traditional course.

For many struggling students, it is not the algebra itself that creates problems, it's the mathematical rigor of negative numbers, fractions, and symbols.

Fourteen Factors of a Successful Algebra Program

6. For this reason, teach initial concepts with positive whole numbers. As students gain fluency and familiarity with concepts, introduce negative numbers, decimals, and fractions.

7. Many errors are not the result of problems with algebra, but with negative numbers. For this reason, students should have ongoing instruction and practice with integers.

8. Research, not routine, should guide instruction. Read what valid research has said about mathematics instruction. Experiment. Keep what works. Don't be afraid to toss a long-standing or accepted instructional practice if you find a better way.

Fourteen Factors of a Successful Algebra Program

9. For all concepts, try to teach multiple strategies for problem solving. Demonstrate algebraic approaches, graphical models, and any other tactics that are appropriate. For example, when teaching students to solve systems of equations, show them how to solve them by graphing, elimination, and substitution.

10. Teach algebra as a natural extension of arithmetic. For example, teach multiplication of binomials as an extension of two-digit by two-digit multiplication. This will not only provide critical opportunities for students to improve their number skills, it will provide a seamless transition from the familiar world of numbers into the more abstract world of algebra.

Fourteen Factors of a Successful Algebra Program

11. It is critical to make math enjoyable. Math can be beautiful and engaging or it can be dull and coma-inducing. Teachers hold the keys for this. Engage students in math projects that allow students to experience the beauty of math as they delve extensively into the skills they have studied. This is the opposite of the “mile wide and inch deep” approach as it lets students dig deeply into specific skills and concepts. See examples of this on the “Student Work Site” section of our website: www.tttpress.com.

12. Don't be afraid to step outside the textbook. Texts are a valid and powerful tool, but they are not a cure-all or a golden bullet. They are reference works just as dictionaries are. They are also the most difficult reading material in schools. Students learn from teachers, not from textbooks.

Fourteen Factors of a Successful Algebra Program

13. This brings us to a very important point. Probably the most critical factor in helping students learn algebra has nothing to do with numbers and everything to do with the teacher. A personable teacher who communicates a caring attitude working in the supporting environment of a nurturing school will have much greater success in teaching students than an expert mathematician who fails to connect with students. I used to teach math; now I teach students.

14. Above all else, set high standards for all students. Expect everyone to achieve them. No one ever jumped high by aiming low, and even if we miss, we jump higher than before.

How to Create a Great Math Classroom to Promote Great Math Students

Give your students a small piece of paper, and ask two simple questions:

1 – “What am I doing that helps you learn math?”

and

2 – “What needs improvement?”, or

“What can I do better?”

Ask students to take some time answering these questions. Students don't need to sign their names, and it may be best if they don't.

Then read each student's replies, and list them on a transparency, on the board, or on a piece of paper.

Pay attention to comments that occur often. Then talk about these responses the next day so students see that you value what they have to say. Modify what you can to meet their needs, and explain why you may not be able to do some of the items.

Do this twice a year and your students will appreciate you and their math class!

Qualities of a Good Math Teacher

Project work

Have the room be colorful

Posters on the walls that have to do with class

Someone who plays math games

Gives help when asked

Make sure you're organized

A math teacher should really love teaching math

A smile, sense of humor, and a box of chocolate

Go over material multiple times

One-on-one help

Always have a review before a test

Do examples - leave on board for reference

Patience – take time with each student

Make math fun

Make math not boring

Be as clear as possible

(These responses are from Bill Lombard's 2004-05 Trig/Precalculus students. They are good consumers of mathematics, quite articulate about what they like and what they don't.)

Five Concepts & Key Ideas:

- ✓ Multiple Representations
- ✓ Concepts and Skills Interwoven
- ✓ Language in the Math Classroom
- ✓ Extensibility up and down the Skill Levels
- ✓ Connect the Known/familiar to the Unknown/unfamiliar

Teachers will become empowered with skills and activities so their students will become powerful problem solvers and creative mathematical thinkers.

Things of Beauty

“The English language in the hands of a gifted poet is a thing of beauty.”

“Mathematics in the hands of a skilled craftsperson is a thing of beauty as well.”

“Teachers have the ability to provide the environment to stimulate children to become skilled and gifted math people.”

– Bill Lombard

Time, Modeling, and Development

When math lessons begin with
Concrete/manipulative pictorial models

Continue through the
Linguistic, tabular, graphical model

Finishing with the
Formula/abstract model

Then you can move children from the
concrete to the abstract in a seamless fashion
and not lose them along the way.

* * * * *

“Mathematics understandings are not
mastered, but are developed, elaborated,
deepened, and made more complete over
time.”

– Joan Akers

“Thus a teacher of mathematics has a great opportunity. If he fills his allotted time with drilling his students in routine operations he kills their interest, hampers their intellectual development, and misuses his opportunity. But if he challenges the curiosity of his students by setting them problems proportionate to their knowledge, and helps them to solve their problems with stimulating questions, he may give them a taste for, and some means of, independent thinking.”

– George Polya,
master teacher of problem solving

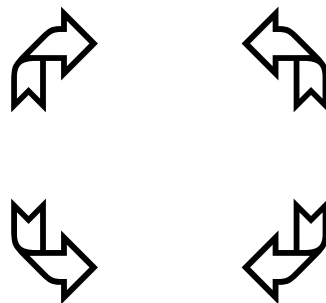
Arithmetic vs. Algebra

* * * * *

Arithmetic Likes Answers

* * * * *

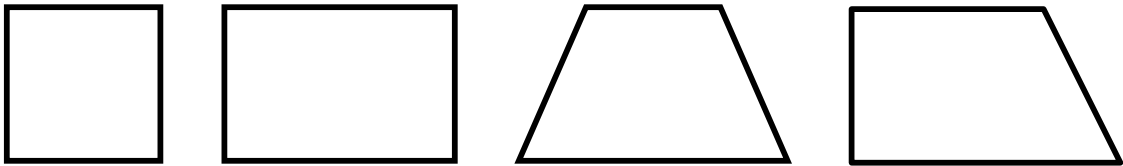
Algebra Likes Structure



Look for arithmetic problems that have similar properties. Find the pattern and order in the problems (generalization) and you will find the algebra that rules them all.

Same and/or Different

Research shows that some of the biggest gains in understanding (and test scores) occur when students see teaching examples in terms of what is the same, and/or what is different.



Integrating Problem Solving Strategies into Daily Curriculum

- Introduce a problem solving strategy and show a simple application of the strategy
- Provide another problem for a warmup or homework
- Continue adding variations of the strategy by changing the numbers or context of the problem

Move to another strategy when students seem to master the first strategy

Problem Solving Signs

To assist students in solving problems, it's helpful to have methods available for them to view. Here are some that have worked for many students in many situations.

- ✓ Use Past Experience
- ✓ Just Graph It!
- ✓ Guess & Check
- ✓ Solve a Simpler Problem
- ✓ Find A Pattern
- ✓ Find a Formula
- ✓ Work backwards
- ✓ Make a Diagram
- ✓ Be Physical
- ✓ Make an Organized List
- ✓ Venn Diagram

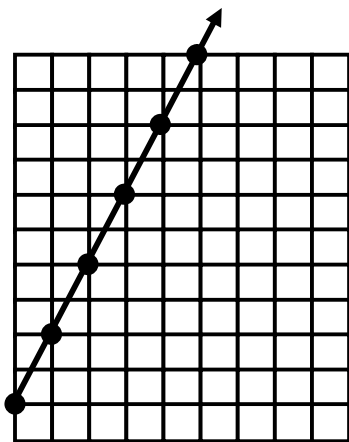
Find Your
Favorite Method

Use It to
Solve Problems!

Use Past

Experience

Just Graph It!

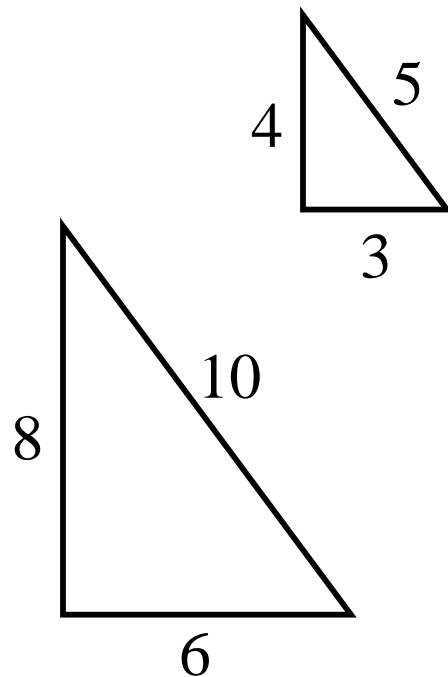


Guess & Check

?



Solve a
Simpler
Problem



Find a Pattern

aabaacaadaa_

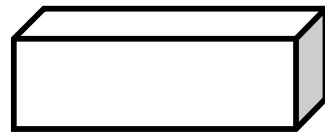
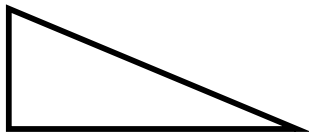
Find a Formula

$$f(n) = 2n + 1$$

Work

Backwards

Make a
Diagram



Be Physical

Use a Model

Act It Out

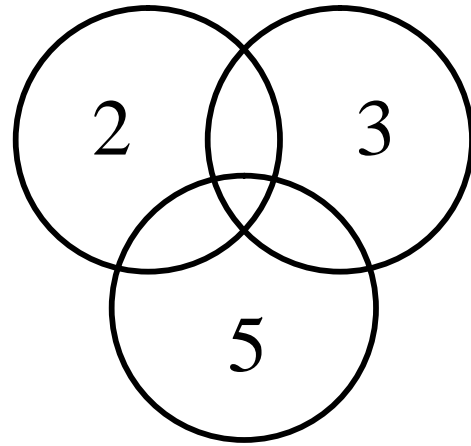
Manipulatives

Make an

Nickels	0	2	4	6
Dimes	3	2	1	0

Organized List

Venn



Diagram

Bill's Method

Customizing Activities

The activities supply the structure; you supply the content/ingredients.

- ✓ Positive / negative numbers
- ✓ Fractions, decimals, percents
- ✓ Group work / individual work
- ✓ Warmups, homework, quizzes
- ✓ Journal writing, projects
- ✓ Where are your students going?
- ✓ Where have your students been?

Activities as long term content of your math class

Teaching Skill

Good teachers need more than just content knowledge and an ability to manage a classroom (a.k.a. keeping kids quiet and orderly).

They must be able to find out why their students make mistakes on problems, and then be able to explain WHY their method is incorrect.

So the teacher must know mathematics at a deeper level than just the steps of an algorithm to impart this knowledge to students.

Language in the Math Classroom

Activity: Journal prompts

- ✓ Language takes students to a deeper level
- ✓ To speak or to write well is to think well
- ✓ Language shows us what students are thinking
- ✓ Language offers realistic and accurate assessment
- ✓ The English teachers will like you
- ✓ Promotes communication
- ✓ Journal prompts are easily created
- ✓ Helps teachers correct misunderstandings
- ✓ Brain uses language to process information

Reasons to Incorporate Language in a Mathematics Class

Just as computers use an operating system to function, language is the operating system of our brains.

Simply stated, to speak or write well is to think well.

Both oral and written language are effective in increasing depth of understanding.

It is probably a much better investment of a teacher's time to look at a writing sample as an assessment than to look at a homework paper.

Good Questions That Get Good Answers

Students love to talk. They talk between classes; they talk during class. The trick is to get them to talk *about* class. Nowhere is this more difficult than during math. Although students may offer hypotheses in science, comments during literature, or explanations during history, their dialogue in a math class is usually limited to guessing a number when the teacher calls upon them. In this month's issue, we take a look at strategies that will elicit good mathematical thought from students.

Procedure:

The trick to getting good answers is asking good questions. And the trick to asking good questions is simple. Here are ten quick questions you can ask at any time that will promote better student thinking and good student responses:

- How did you solve the problem?
- Can you solve the problem a different way?
- Is this similar to another problem you have solved?
- Can you suggest a rule or formula for solving problems like this one?
- What patterns do you notice?
- Does that answer seem reasonable?
- What information is relevant in this problem?
- How could you convince me that you are right?
- Do you agree or disagree with what that student said? Why?
- Why does that work?

1 *How* we ask our questions is as important as *what* we ask. Typically we teachers get in the habit of calling on students who raise their hands. However this sends a signal to the other students that if you don't raise your hand, you don't have to participate. A more effective strategy is to ask the question, wait for five seconds, then call on a student whether his or her hand is raised or not. Five seconds will seem like an eternity, but students will get used to this critical think time. It is important in this situation to make sure you have asked a question that any student should be able to answer. Calling on students who are not paying attention or who don't know how to answer the question will usually embarrass them. This tends to inhibit the class discussion instead of encouraging it.

Another strategy is to say, "I'm going to ask a question, and for 30 seconds, I don't want you to answer or discuss it with anyone else. Just think about the problem and how you would respond." After 30 seconds say, "Now explain your answer to the person sitting next to you." After this, you can call on individual students to share. This 30-second delay is very important for high-level questioning. It also gives plenty of time to shy or reluctant students who may hide behind the responses to students who reply quickly.

2 For even more detailed answers, generate questions by filling in the blanks of this simple template:

As a (voice), explain to (audience) about (specific topic).

Here are samples of how this looks:

- As a teacher, explain to a fourth grader why you need to divide by two to find the area of a triangle.
- As a worker bee, explain to the queen why the hexagon is the best shape for the hive cells.
- As a fellow student explain what we learned yesterday to a student who has been absent.
- As a teacher, explain to a parent what we are working on in class.

Giving students a specific voice and audience helps them think more clearly about the subject at hand. Narrowing the focus of the question is important too. It is better to ask a student to explain why it is necessary to divide by two to find the area of a triangle than it is to ask a student to explain area or triangles.

Here are sample voices and audiences. The specific topic is whatever you are studying at the time.

Voice:	Audience:
Teacher	Younger student
Younger student	Sibling
Older student	The President
Alien	Employee
Parent	Customer
Principal	Boss
News reporter	Teacher

3 The last component of good questioning involves the *types* of questions we use. Although it is important to ask students to tell the answers to specific math problems, this is not where we will generate good math talk. Mathematics that lends itself to good questioning *looks* different than the simple math problems found in most texts. For this reason, we have included four transparency masters of problems that can be the basis for good questions. Simply display them for the students, allow them sufficient time to think about and work on the problems, and then ask them the suggested questions in section 1 above.

Building a community of mathematical thinkers who value good discussion and who respect the opinions of others can be accomplished with simple steps, but it is not accomplished quickly. Like any good skill, it develops over time. Be patient, and you will be rewarded with good results.

Asking a Question in the Right Way

Four Key Elements of a Good Question

- ✓ Audience
- ✓ Voice
- ✓ Format
- ✓ Specific Topic

“Tell me what you know about area.”

or

“As an architect, write an note to a client explaining how to calculate the square feet in the bedrooms of their new house.”

Simply including these four elements in your question is all that is needed to promote effective responses.

The Power of the D.A.E.O.P.

Due At the End Of Period

When I want to make sure all students understand how to perform a process, I will ask them to solve an example problem that is placed on the board.

Students must show on their paper all the needed steps to arrive at the correct solution.

I am interested in the process they used as much as in the actual answer.

Before class is over, all students must come to see me with their solutions.

If correct, I stamp their paper. If incorrect, **the student** must find the mistake.

This results in students having to examine their own work, causing them to focus better and providing self assessment.

Arithmetic Algorithms

"The depressing thing about arithmetic badly taught is that it destroys a child's intellect and, to some extent, his integrity. Before they are taught arithmetic, children will not give their assent to utter nonsense; afterwards they will."

– W.W. Sawyer, *Mathematician's Delight*

"Ours is not to reason why; just invert and multiply."

– rhyme used to remember the algorithm for dividing fractions

It's possible to teach arithmetic by rote, but this isn't a good way.

Students can remember the operations easier if they know the reasons why they work.

Students that successfully move on to higher mathematics are those who can reason and think for themselves, not just follow teacher directions.

Teachers: Emphasize Math Concepts

Research comparing teaching methods of U.S. teachers with those from other countries suggests that American teachers don't spend as much time talking about and teaching the basic concepts of mathematics. More time in the U.S. is spent on getting "the answer" and less time on "the why and how" of the problem.

Many of our teachers need assistance in ways to engage children in problems that deal with conceptual thinking. Teachers in general teach the way they were taught, and thus don't have a strong background in asking questions that probe children's thinking about math.

There is no single teaching method that works for all teachers and all students. But if students are provided with problems and activities that provide access to multiple paths to their solution, we will have come a long way towards powerful mathematical thinking.

“Learners construct understanding for themselves.

To understand is to know relationships.

Knowing relationships depends on having prior knowledge.”

– Lawrence Lowery

Placing new knowledge properly assists student learning – too far away and students can’t grasp it. Too familiar and it leads to boredom. Information nearby, easily accessible, but not completely mastered, leads the brain into active exploration, emotion, and enthusiasm.

“Research shows that a self-assessing activity fosters learning better than one in which a student merely receives a grade from the teacher.”

– Brad Fulton

Ways to Reduce Math Anxiety

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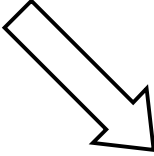
- ✓ Show students problem solving strategies
- ✓ Find ways to help students visualize things
- ✓ Relate mathematics to the real world

There are entire college courses with the focus on “Reducing Math Anxiety”.

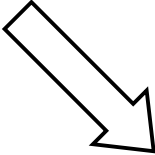
Puzzles and Problem Solving

Research tells us:

Puzzles help students improve their spatial visualization.



Spatial visualization, in turn, assists students in becoming better problem solvers.



So puzzles are great teachers.

What Studies Say about Teaching

"Students whose teachers conduct hands-on learning activities outperform their peers by more than 70% of a grade level in math and 40% of a grade level in science."

"In math, students whose teachers emphasize higher-order thinking skills outperform their peers by about 40% of a grade level."

One of the recommendations to policy makers:
"... teachers should be encouraged to convey higher-order thinking skills [and] conduct hands-on learning activities ... "

Despite what some critics think, teaching *does* matter. And teaching based on the recommendations of the mathematics reform movement *does* make a positive difference.

From How Teaching Matters: Bringing the Classroom Back Into Discussions of Teacher Quality.

A Policy Information Center Report from the Educational Testing Service
Report written by Harold Wenglinsky, October 2000.

How do you get to Carnegie Hall?

Practice, practice, practice . . .

Coaches look at game films of opponents

“Consistent practice over time builds skills, confidence, and success – there are really no shortcuts – it’s not rocket science. Where the teacher can be most helpful is making this practice enjoyable and causing students to experience the joy of being able to easily do things they once thought difficult or impossible.”

– Bill Lombard

THE QUADRATIC FORMULA PROOF

$$ax^2 + bx + c = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

Divide by a

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

Subtract $\frac{c}{a}$ from both sides

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = -\frac{c}{a} + \left(\frac{b}{2a}\right)^2$$

Complete the square

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = -\frac{c}{a} + \frac{b^2}{4a^2}$$

Rewrite in simpler form

$$\left(x + \frac{b}{2a}\right)\left(x + \frac{b}{2a}\right) = -\frac{c}{a} \cdot \frac{4a}{4a} + \frac{b^2}{4a^2}$$

Factor on left;

Find LCD on right

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

Simplify

$$\sqrt{\left(x + \frac{b}{2a}\right)^2} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

Take square root of both

$$x + \frac{b}{2a} = \frac{\pm \sqrt{b^2 - 4ac}}{2a}$$

Simplify

$$x + \frac{b}{2a} - \frac{b}{2a} = \frac{\pm \sqrt{b^2 - 4ac}}{2a} - \frac{b}{2a}$$

Solve for x

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Proof of the Quadratic Formula

- ✓ Takes 9 – 15 steps
- ✓ Takes several days of constant teacher attention
- ✓ Takes modeling in class at least eight times
- ✓ Covers & reinforces many important concepts
- ✓ Gives students a real feeling of accomplishment

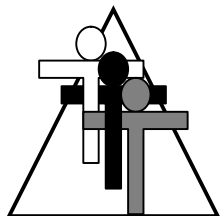
Why use Brad and Bill for inservice training?

Four simple reasons:

- ✓ They have a passion for mathematics that is catching
- ✓ They allow teachers/students to participate in math in new and exciting ways
- ✓ They make math fun ! !
- ✓ They make math real; they show new relationships between mathematics and real life

Call Brad or Bill for an exciting, fun-filled, math-filled day for you and your staff.

Find out what thousands of other math teachers and trainers know.



Brad Fulton and Bill Lombard

Teacher to Teacher Press

“Building Mathematical Skill on a Foundation of Understanding”



Brad Fulton

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(530) 547-4687 brad@tttpress.com

- ◆ **Consultants**
- ◆ **Educators**
- ◆ **Authors**
- ◆ **Seminar leaders**
- ◆ **Teacher trainers**
- ◆ **Conference speakers**



Bill Lombard

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(530) 243-2064 bill@tttpress.com

Known throughout the country for motivating and engaging teachers and students, Brad and Bill have authored over ten books that provide easy-to-teach yet mathematically-rich activities for busy teachers. In addition, they have co-authored six teacher training manuals full of activities and ideas that help teachers who believe mathematics must be both meaningful and powerful.

Seminar leaders and trainers of mathematics teachers

- ◆ California Math Council and NCTM presenters
- ◆ Lead trainers for summer teacher training institutes
- ◆ Trainers/consultants for district, county, regional, and national workshops

Authors and co-authors of mathematics curriculum

- ◆ *Simply Great Math Activities* series: five books covering all major strands
- ◆ *Math Discoveries* series: four books bringing math alive for students in middle schools
- ◆ Teacher training seminar handbooks for elementary, middle, and secondary teachers

Workshops, conference sessions, and keynote addresses

All workshops provide participants with complete and ready-to-use activities. These activities require minimal preparation, use materials commonly found in classrooms, and give clear and specific directions and format. Participants will also receive journal prompts, homework suggestions, and ideas for extensions and assessment.

“Excellent...relevant...useful...practical...engaging.”

Tizoc Tirado, kindergarten teacher

“I have learned more about math in these five days than in all my career.”

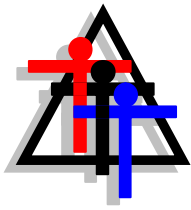
Annie Jackson, 5th grade teacher

“Brad and Bill’s math activities are the best I’ve seen in 30 years of teaching!”

Wayne Dequer, 7th grade math teacher

“The best and most practical and relevant workshop I have ever attended. Thank You!”

Leslie Lowman, high school teacher



Teacher to Teacher Press

“Building Mathematical Skill on a Foundation of Understanding”

TESTIMONIALS FROM TEACHERS

“Brad and Bill's math activities are the best I've seen in 30 years of teaching middle school! These activities are engaging and meaningful but simple to use. They are invaluable in infusing algebraic concepts and processes into lower grades in preparing all students for the demands of formal algebra. Many other math teachers at my school site are finding them equally useful.”

– Wayne Dequer, 7th grade math teacher, Arcadia, CA

“The most informational workshop I have ever attended. This is a workshop everyone should attend. There is information available for use in any grade or classroom.”

– Melba VanPelt, RSP Special Education, Palmdale, CA

“A fun and innovative way to teach math. I have used Brad and Bill's activities with middle school and high school students with great success. I have also presented them to teachers in workshops and in an algebra standards course at the college level as an excellent way to actively involve students in learning important algebra concepts.”

– Terry L. Nevin, Algebra Teacher/El Dorado High School, Placentia, CA

“If we want students to engage in mathematics, we need to have engaging, rigorous curriculum to share with them. These units do that better than anything else I have ever used. The activities can be modified to use at many grade levels to introduce or review important mathematical concepts. Students love the activities, and because of the connections to the world outside of school, parents are impressed with what their students are learning to do.”

– Judy Ferrarri, 4th/5th grade teacher, Springfield, OR

“Your methods should be taught to all math teachers and in all math books!! What a wonderful way to teach outside the box.”

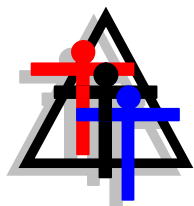
– Nancy Heim, Adult Education, Dana Point, CA

“The content was great! Very captivating and energetic. The whole staff was very involved with the activities.”

– Michelle Wehrhan, Title 1 Teacher, Santa Ana, CA

“Absolutely loved the step-by-step process of leading the students to complex algebraic processes while providing a deep understanding for the students at every step.”

– Kathy Meiser, 4th grade/GATE, Palmdale, CA



Teacher to Teacher Press

“Building mathematical skill on a foundation of understanding”

TESTIMONIALS FROM ADMINISTRATORS

“Teacher To Teacher Press materials and program workshops have provided Orange County teachers with a rich and important set of resources, models, and instructional tools in mathematics. These resources have been successfully applied and used to boost teachers’ and students’ understanding of mathematics. The use of these materials, coupled with our ongoing staff development program, has positively impacted student learning. The Teacher to Teacher Press materials and presenters are both adept and talented in their approach, understanding, and use of modeling to facilitate concept development. These program materials continue to provide a rich resource of ideas and strategies for the classroom teacher.”

Ed Rodevich
Coordinator, Math/Science
Orange County Department of Education
Costa Mesa, California

“I am a mathematics consultant with the Los Angeles County Office of Education. We have had Brad Fulton present numerous times to many elementary, middle, and high school teachers who provide mathematics instruction in Los Angeles County. Brad has presented workshops in all the strands, and on a regular weekday he commands an audience close to 200 participants. Many of them are second or third time attendees who want more of his strategies to make math accessible.

These strategies are taken from the eight books written by Brad and his partner, Bill Lombard, and published by Teacher to Teacher Press. From their partnership, innovative activities have been developed and extended into week-long explorations to give students an opportunity to deepen their mathematics. At the same time, teachers work on these activities to increase their own mathematics content knowledge at Brad and Bill’s workshops. Used with research-based lesson plans, these strategies support the California Mathematics Content Standards and help to strengthen conceptual understanding and mathematical reasoning while increasing students’ motivation. Brad Fulton and Bill Lombard have provided materials and methodologies, and have helped both teachers and students in Los Angeles County strengthen and enjoy their mathematics learning.”

Yuki Mio
Mathematics Consultant
Los Angeles County Office of Education
Downey, CA 90242

MORE! MORE! MORE!

Visit the Teacher to Teacher Press website at...

www.tttpress.com

...for many other great math activities. On our website you will find:

- ◆ A complete catalog of our materials
- ◆ Free sample chapters from our books
- ◆ Downloadable handouts from our workshops
- ◆ Quotes for motivating students
- ◆ Links to other valuable resource websites
- ◆ Order forms for our materials
- ◆ A bibliography of great mathematical reading
- ◆ Calendars showing presentations by Bill and Brad

Happy surfing!
Brad and Bill