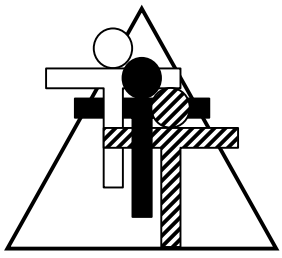
Using
CONCEPTUAL LAYERING
To Develop Algebraic Understanding
A Demonstration using Leo's Pattern

By Brad Fulton
California League of Middle Schools
Educator of the Year, 2005
brad@tttpress.com



Teacher to Teacher Press
www.tttpress.com
PO Box 233, Millville, CA 96062
Phone: (530) 547-4687
Fax: (530) 547-4317

Brad Fulton and Bill Lombard

Teacher to Teacher Press

"*Building Mathematical Skill on a Foundation of Understanding*"

Brad Fulton

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

Bill Lombard

PO Box 233, Millville, CA 96062
(530) 547-4687 brad@tttpress.com

5885 Avery Way, Redding, CA 96003
(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: bringing math alive for students in middle schools
- Teacher training seminar materials handbooks for elementary, middle, and secondary school

Available for workshops, keynote addresses, and conference sessions.

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.

Brad and Bill's math activities are the best I've seen in 30 years of teaching!
Wayne Dequer, 7th grade math teacher

"The high-energy, easy-to-follow handouts were clear. The instructors were great!"
DeLinda Van Dyke, middle school teacher

References available upon request

Conceptual Layering

A Teaching Strategy for Inclusion

By Brad Fulton

Too often, students "fall off the algebra train". It is as if the train comes by at full speed and students are asked to hop aboard. Those that can run fast may make the jump, but most fail to ever get on board. Carrying the analogy further, it would seem reasonable that if the train began more slowly, more could hop aboard. Then the train could come up to speed without losing passengers.

In fact, this can be done. The underlying principles of algebra are not difficult to comprehend. Students as young as 4th grade have been able to work with variables, simplify expressions, solve linear equations, understand slope and intercepts, and solve systems of equations. They not only have solved such problems, they have shown that they understand them. Even primary students have been able to understand concepts such as combining like terms, solving equations, and using implied multiplication with coefficients and variables. If students can grasp the concepts of algebra at these young ages, we must believe they can master algebra 1 in the middle grades.

Conceptual Layering is a teaching process that allows students to first establish a conceptual foundation for their algebraic thinking. Then upon this solid foundation, they build a solid structure of algebraic rigor. Conceptual layering starts with the simplest form of the concept being taught. Higher and higher levels of understanding are gradually presented until the student is performing at the desired level. For example, to teach the distributive property, we might begin thinking about food ordered at a restaurant. If h represents a hamburger, and f represents an order of fries, then this expression represents three orders of a hamburger with fries:

$$3(h+f)$$

We might ask the students what food will be prepared. Clearly the restaurant needs to give the customer three hamburgers and three orders of fries. This leads us to a very basic application of the Distributive Property.

$$3(h+f)=3h+3f$$

This approach also alleviates the confusion students often encounter of not distributing the coefficient across all the terms in the parentheses. The following error is common when students think of distribution solely at symbolic levels.

$$3(h+f)=3h+f$$

Now the student is asked to practice this concept until they have a sufficient mastery. This will likely take only two or three examples as opposed to the two or three dozen practice problems that might be assigned traditionally. Then the teacher can increase the complexity (accelerate the speed of the train) by adding some cheeseburgers or sodas to the order.

$$4(2c+f+3s)$$

Once this level is mastered, the teacher can introduce letters that are not typically associated with food, such as x and y as shown here. This will be a gradual transition in the mind of the learner.

$$4(x+y)$$

Next the teacher might use a negative coefficient, or a decimal value. If the students have already learned how to multiply variables, the distributive property can be expressed with variables alone.

$$-4(x+y)$$

$$.4(x+y)$$

$$x(x+y)$$

Notice that none of these stages requires extensive practice time. A few examples are all that is needed. When complete, the same total amount of work has been done, but the *concepts were incrementally layered* so that the increase in complexity was gradual. In conceptual layering, the teacher decides how far to take

the lesson, as some students do not need to get to the final level until they are in the algebra 1 course. While some students may get off the train sooner than the teacher would want, they make it a lot further toward the destination because they were allowed to get aboard in the first place.

Unlike *scaffolding* which is used to sequence concepts and units of study as they are taught, conceptual layering looks within those concepts to determine the most natural and efficient way to present them to the brain of the learner. Conceptual layering reflects the brain's natural learning style. Our brains seek complexity and challenges, but they prefer this to be done in an incremental way. We are intrigued by anomaly and incongruity. We are attracted to the interestingly unusual. If I told you I was thinking of the following pattern, {1, 2, 3, …} you would probably suspect that the next number is four and you'd probably be bored by its simplicity. However, if I told you that it was five, you would be more likely to be intrigued. You would want to know what I was thinking. It might even bother you if I refused to explain it. Once you see that adding two adjacent numbers yields the next (The Fibonacci sequence: 1+2=3, 2+3=5, etc.), then you understand and have a sense of relief. Your brain would then go on to seek other stimulation. Our brains are attracted by a mild degree of confusion.

Textbooks fail to take advantage of this natural learning mode of our brains. In general, when a new concept is introduced, the initial examples and practice problems will entail decimals, fractions, and integers. The learner focuses so much mental effort on the arithmetic, they often fail to comprehend the overarching concept being taught. Unfortunately the typical algebra curriculum offers too great a degree of confusion to satisfy and engage most learners. The solution, to remediate the child with a rehashing of previous year's mathematics fails to challenge their brains at all. Conceptual layering is the solution to both of these errors and offers the surest way for students to achieve success in mathematics.

ACTIVITY 9

Materials:

- ☒ paper
- ☐ activity master
- ☐ calculators

Leo's Pattern

Overview: Based on the famous Fibonacci sequence, this activity helps students develop numbers sense as they work with addition and subtraction. Decimals and integers are easily incorporated, and estimation skills are honed. It is a nice activity for the teacher since much of the work is self-correcting.

Vocabulary: Fibonacci, sequence, addend, recursive pattern

PROCEDURE

Skills:

- Addition and subtraction of whole numbers, decimals and integers.
- Estimation
- Guess and check
- Working Backwards

1 Display a transparency of Leo's Pattern A, and cover up most of the page, displaying only the first pattern, A1. Explain the structure of the first pattern, and tell students that each one of the patterns on the page follows the same rule: Add the first two terms to get the third term, add the second and third term to get the fourth term, and continue in this way. Two consecutive terms always add to get the following term. Patterns defined this way are called recursive patterns.

2 Show the class the rest of the patterns from set A. These patterns are examples of the recursive rule and show students that the rule can be used with many different sets of numbers.

3 Then ask the students to complete pattern B1. Set B patterns are missing the second term. Students should see that the second term is the difference between the third and first terms. Many students will be able to finish these patterns in their heads. You may create patterns as needed for more practice. Decimals, fractions, and negative integers make great entries for the terms.

4 After your students feel comfortable with the rule, patterns from set C may be introduced. Some of your students will feel challenged for the first time with set C patterns. Two numbers are missing between the numbers that are supplied in these patterns. This is a good time to introduce the problem solving technique of **Guess and Check**. With pattern C1, students may try to guess the number that comes after the 3, and then add the first two terms to get term three, and then add terms three and four to see if they sum to 17. If they guessed wrong the first time, they need to adjust their guess for term two, and try again. For pattern C1, this should not take too long, and students have a sense of accomplishment when they guess the right number.

5 Estimation skills and numbers sense will increase with the

complexity of the problems and with the amount of practice. You students will begin to notice patterns as they work. For example, if a student tries to put a four in the second blank of C1, they hit an 11 instead of a 17 in blank four. This tells the student that the guess was too low. If a 12 is tried, the student lands on 27, which is too high. Now the student knows that the correct answer is greater than four and less than 12. In fact, if the guess is decreased by one, and an 11 is tried, the target decreases by two to 25. This is double the guess. Since we want to decrease the target *eight* more to 17, we must decrease our guess *four* more to 7. This results in the correct answer.

3, __, __, 17, __, __

3, **4**, 7, 11 (low)

3, **12**, 15, 27 (high)

3, **11**, 14, 25 (high)

3, **7**, 10, 17 ☺

Journal Prompts:

If the first term of Leo's Pattern is 4 and the fourth term is 0, what must be true of the second term? Why?

If the first term of Leo's Pattern is 2 and the fourth term is 5, how would you find the second term?

Describe to a student who was absent how to find the second and third terms of sequence C3 by the Guess and Check method.

Homework:

You can assign one of the transparency/activity masters for homework or create ten new patterns for students to solve. Give terms 1 and 4 only. You may wish to include decimals, fractions, or negative numbers as solutions.

You can also ask ten students create a problem, write them on the board, and then assign the set for homework.

Taking a Closer Look:

There is a lot of algebra lurking in Leo's Patterns. For a more complete treatment of the algebraic solutions, refer to our algebra book, *Simply Great Math Activities: Algebra Readiness, Volume 2*.

Assessment:

Use the answer key provided or have students check each other's work.

Good Tip!

The activity is named in honor of Leonardo of Pisa, also known as Fibonacci, "son of good nature". You may wish to have students research the mathematician and the sequence he developed. The Fibonacci pattern shows up in nature quite often and explains why there are so few four-leafed clovers.

Answer Key:

A1	5	8	13	21	34	55	89
A2	7	11	18	29	47	76	123
A3	12	19	31	50	81	131	212
A4	10	12	22	34	56	90	146
A5	6	10	16	26	42	68	110
A6	18	26	44	70	114	184	298
A7	1	21	22	43	65	108	173
A8	13	47	60	107	167	274	441
A9	7	49	56	105	161	266	427
A10	46	104	150	254	404	658	1062
B1	2	4	6	10	16	26	42
B2	3	6	9	15	24	39	63
B3	2	7	9	16	25	41	66
B4	1	5	6	11	17	28	45
B5	2	9	11	20	31	51	82
B6	8	1	9	10	19	29	48
B7	7	7	14	21	35	56	91
B8	19	0	19	19	38	57	95
B9	16	16	32	48	80	128	208
B10	74	37	111	148	259	407	666
C1	3	7	10	17	27	44	71
C2	4	8	12	20	32	52	84
C3	6	3	9	12	21	33	54
C4	5	2	7	9	16	25	41
C5	7	2	9	11	20	31	51
C6	8	11	19	30	49	79	128
C7	16	2	18	20	38	58	96
C8	0	24	24	48	72	120	192
C9	34	47	81	128	209	337	546
C10	43	44	87	131	218	349	567
D1	4	-2	2	0	2	2	4
D2	5	-3	2	-1	1	0	1
D3	5	-2	3	1	4	5	9
D4	6	-3	3	0	3	3	6
D5	-8	0	-8	-8	-16	-24	-40
D6	12	-8	4	-4	0	-4	-4
D7	24	-16	8	-8	0	-8	-8
D8	17	-18	-1	-19	-20	-39	-59
D9	44	-23	21	-2	19	17	36
D10	-35	17	-18	-1	-19	-20	-39

E1	9	-5	4	-1	3	2
E2	12	-12	0	-12	-12	-24
E3	-16	11	-5	6	1	7
E4	-14	9	-5	4	-1	3
E5	0	-6	-6	-12	-18	-30
E6	2	-3	-1	-4	-5	-9
E7	28	-25	3	-22	-19	-41
E8	-6	5	-1	4	3	7
E9	-17	10	-7	3	-4	-1
E10	-59	34	-25	9	-16	-7

F1	3	-6	-3	-9	-12	-21
F2	9	-11	-2	-13	-15	-28
F3	-6	4	-2	2	0	2
F4	-8	4	-4	0	-4	-4
F5	15	-7	8	1	9	10
F6	0	-8	-8	-16	-24	-40
F7	22	-14	8	-6	2	-4
F8	-11	0	-11	-11	-22	-33
F9	-26	16	-10	6	-4	2
F10	16	-15	1	-14	-13	-27

G1	3	3.8	6.8	10.6	17.4	28
G2	6.2	0.7	6.9	7.6	14.5	22.1
G3	0.23	0.09	0.32	0.41	0.73	1.14
G4	0.5	0.09	0.59	0.68	1.27	1.95
G5	6.4	1.7	8.1	9.8	17.9	27.7
G6	7.93	0.17	8.1	8.27	16.37	24.64
G7	3.2	0.6	3.8	4.4	8.2	12.6
G8	8.3	8.3	16.6	24.9	41.5	66.4
G9	0.17	0.38	0.55	0.93	1.48	2.41
G10	0.01	0.52	0.53	1.05	1.58	2.63

H1	3	4 1/2	7 1/2	12	19 1/2	31 1/2
H2	3 1/2	2	5 1/2	7 1/2	13	20 1/2
H3	6 1/2	1 1/2	8	9.5	17.5	27
H4	4 1/4	1 3/4	6	7.75	13.75	21.5
H5	1/2	1/4	3/4	1	1 3/4	2 3/4
H6	3/4	1 1/2	2 1/4	3 3/4	6	9 3/4
H7	1/2	2	2 1/2	4 1/2	7	11 1/2
H8	3/4	2	2 3/4	4 3/4	7 1/2	12 1/4
H9	2 1/2	1	3.5	4.5	8	12.5
H10	0	3 1/2	3.5	7	10.5	17.5

Activity Master Name_____

Leo's Pattern A

These patterns all follow the same rule: add two successive terms to get the next term. The original Fibonacci sequence is given, along with additional examples. Find the missing terms.

A1 1, 1, 2, 3, 5, 8, ____, ____, ____, ____, ____

A2 1, 3, 4, 7, 11, ____, ____, ____, ____, ____

A3 2, 5, 7, 12, 19, ____, ____, ____, ____, ____

A4 8, 2, 10, 12, ____, ____, ____, ____, ____

A5 2, 4, 6, 10, ____, ____, ____, ____, ____

A6 8, 18, 26, ____, ____, ____, ____, ____

A7 20, 1, 21, ____, ____, ____, ____, ____

A8 34, 13, 47, ____, ____, ____, ____, ____

A9 42, 7, 49, ____, ____, ____, ____, ____

A10 58, 46, 104, ____, ____, ____, ____, ____

Activity Master Name_____

Leo's Pattern B

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

B1 2, ___, 6, ___, ___, ___

B2 3, ___, 9, ___, ___, ___

B3 ___, ___, ___, ___, 25, 41

B4 ___, ___, ___, ___, 17, 28

B5 ___, ___, ___, 20, ___, 51

B6 ___, ___, ___, ___, 19, 29

B7 ___, ___, ___, 28, ___, 70

B8 ___, ___, 19, 19, ___, ___

B9 ___, ___, 32, ___, 80, ___

B10 ___, ___, ___, 148, ___, 407

Activity Master Name_____

Leo's Pattern C

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

C1 3, ___, ___, 17, ___, ___

C2 4, ___, ___, 20, ___, ___

C3 6, ___, ___, 12, ___, ___

C4 5, ___, ___, ___, 16, ___

C5 7, ___, ___, ___, ___, 31

C6 ___, ___, 19, ___, ___, 79

C7 ___, 2, ___, ___, ___, 58

C8 ___, 24, ___, ___, 72, ___

C9 ___, ___, 47, ___, ___, 167

C10 43, ___, ___, ___, ___, 144

Activity Master Name_____

Leo's Pattern D

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

D1 5, -2, 3, ___, ___, ___

D2 2, -5, -3, ___, ___, ___

D3 4, -6, ___, ___, ___, ___

D4 14, -10, ___, ___, ___, ___

D5 -12, 0, ___, ___, ___, ___

D6 13, -13, ___, ___, ___, ___

D7 -23, 8, ___, ___, ___, ___

D8 35, -21, ___, ___, ___, ___

D9 31, -25, ___, ___, ___, ___

D10 -31, 25, ___, ___, ___, ___

Activity Master Name_____

Leo's Pattern E

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

E1 ____, -5, 4, ____, ____ , ____

E2 ____, ____, ____, -12, -12, ____

E3 ____, ____, ____, ____, 1, 7

E4 ____, ____, ____, ____, -1, 3

E5 ____, ____, ____, ____, -18, -30

E6 ____, ____, ____, ____, -5, -9

E7 ____, ____, ____, ____, -19, -41

E8 ____, ____, ____, ____, 3, 7

E9 ____, ____, ____, ____, -4, -1

E10 ____, ____, ____, ____, -16, -7

Activity Master Name_____

Leo's Pattern F

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

F1 ___, -6, ___, -9, ___, ___

F2 ___, ___, -2, ___, -15, ___

F3 ___, ___, -2, ___, 0, ___

F4 ___, 4, ___, ___, -4, ___

F5 15, ___, ___, 1, ___, ___

F6 ___, ___, -8, ___, ___, -40

F7 22, ___, ___, -6, ___, ___

F8 -11, ___, ___, -11, ___, ___

F9 -26, ___, ___, ___, ___, 2

F10 16, ___, ___, ___, ___, -27

Activity Master Name_____

Leo's Pattern G

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

G1 3, 3.8, ____, ____, ____, ____

G2 6.2, .7, ____, ____, ____, ____

G3 .23, .09, ____, ____, ____, ____

G4 .5, .09, ____, ____, ____, ____

G5 ____, 1.7, 8.1, ____, ____, ____

G6 ____, .17, 8.1, ____, ____, ____

G7 ____, ____, ____, ____, 8.2, 12.6

G8 ____, ____, 16.6, ____, 41.5, ____

G9 ____, .38, ____, .93, ____, ____

G10 ____, .52, ____, ____, 1.58, ____

Activity Master Name_____

Leo's Pattern H

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

H1 3, 4 ½, ____, ____, ____, ____

H2 3 ½, 2, ____, ____, ____, ____

H3 6 ½, 1 ½, ____, ____, ____, ____

H4 4 ¼, 1 ¾, ____, ____, ____, ____

H5 ½, ¼, ____, ____, ____, ____

H6 ¾, 1 ½, ____, ____, ____, ____

H7 ____, ____, ____, 4 ½, 7, ____

H8 ____, ____, ____, 4 ¼, 7, ____

H9 ____, ____, 3 ½, ____, 8, ____

H10 ____, ____, 3 ½, ____, 10 ½, ____

Activity Master A Name_____

Leo's Pattern

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

1 ____, ____, ____, ____, ____, ____

2 ____, ____, ____, ____, ____, ____

3 ____, ____, ____, ____, ____, ____

4 ____, ____, ____, ____, ____, ____

5 ____, ____, ____, ____, ____, ____

6 ____, ____, ____, ____, ____, ____

7 ____, ____, ____, ____, ____, ____

8 ____, ____, ____, ____, ____, ____

9 ____, ____, ____, ____, ____, ____

10 ____, ____, ____, ____, ____, ____

 www.tttpress.com (530) 547=4687

Activity Master B Name_____

Leo's Pattern

These patterns all follow the same rule: add two successive terms to get the next term. Find the missing terms.

1 _____, _____, _____, _____, _____, _____, _____, _____

2 _____, _____, _____, _____, _____, _____, _____, _____

3 _____, _____, _____, _____, _____, _____, _____, _____

4 _____, _____, _____, _____, _____, _____, _____, _____

5 _____, _____, _____, _____, _____, _____, _____, _____

6 _____, _____, _____, _____, _____, _____, _____, _____

7 _____, _____, _____, _____, _____, _____, _____, _____

8 _____, _____, _____, _____, _____, _____, _____, _____

9 _____, _____, _____, _____, _____, _____, _____, _____

10 _____, _____, _____, _____, _____, _____, _____, _____

MORE! MORE! MORE!

Visit the Teacher to Teacher Press website at…

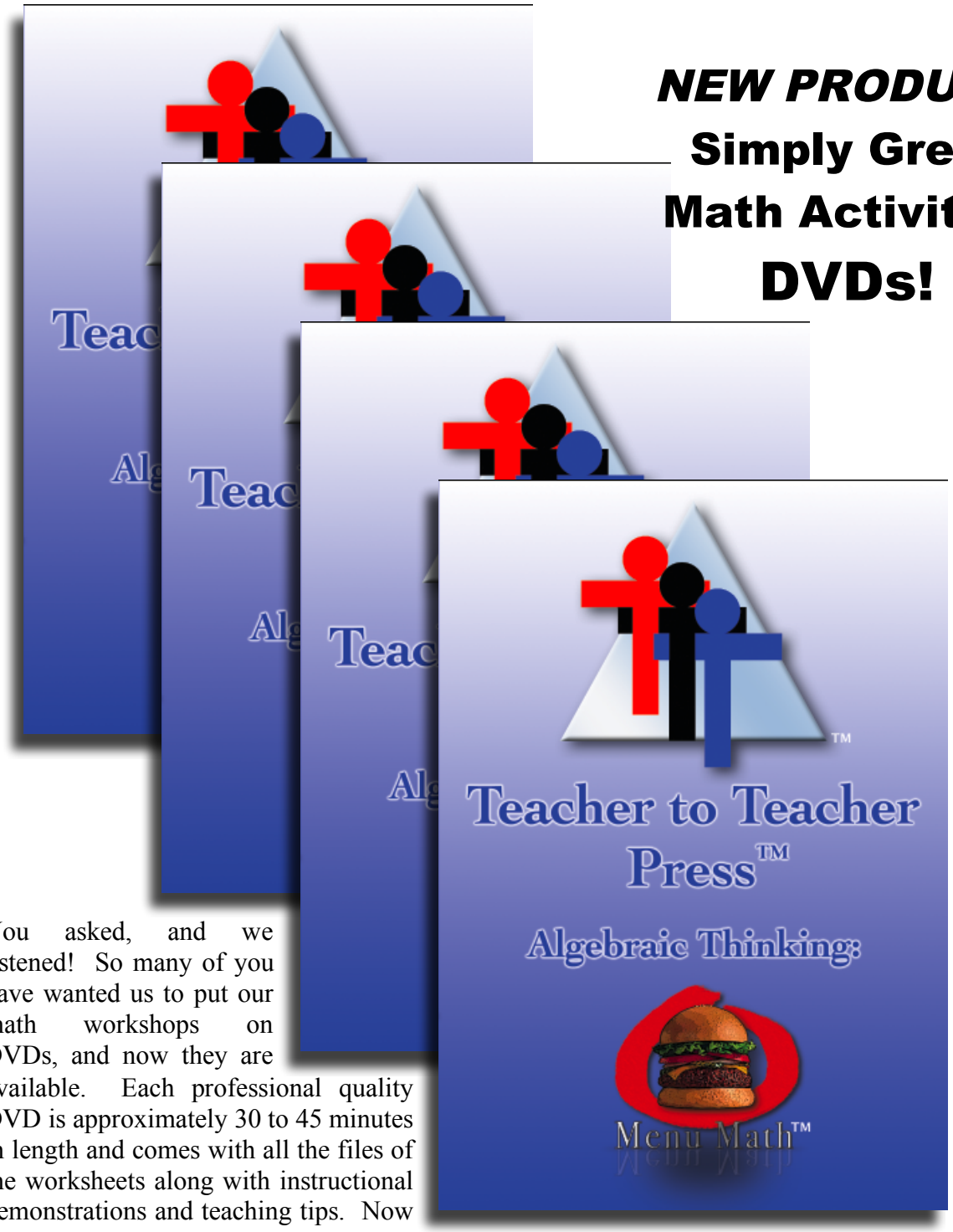
www.tttpress.com

…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 where and when you can hear Bill and Brad present

Happy surfing!

Brad and Bill



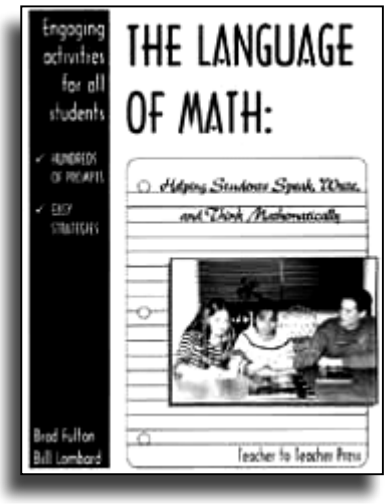
NEW PRODUCT!

Simply Great Math Activities DVDs!

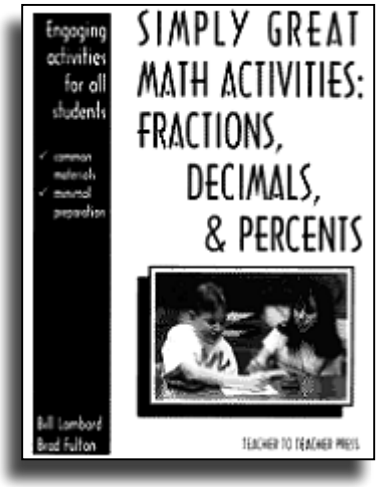
You asked, and we listened! So many of you have wanted us to put our math workshops on DVDs, and now they are available. Each professional quality DVD is approximately 30 to 45 minutes in length and comes with all the files of the worksheets along with instructional demonstrations and teaching tips. Now you can "attend" your own Bill and Brad workshop anytime you want. We offer DVD versions of some of our most popular activities. Check our website to see the latest titles.

www.tttpress.com

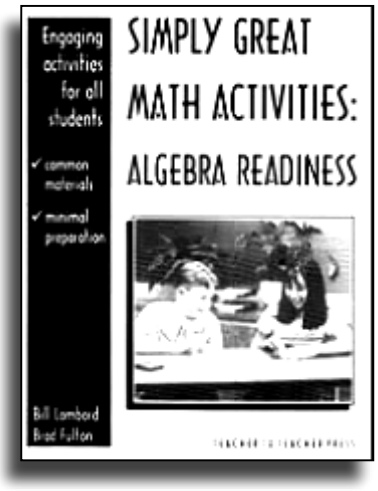
Books by Brad and Bill



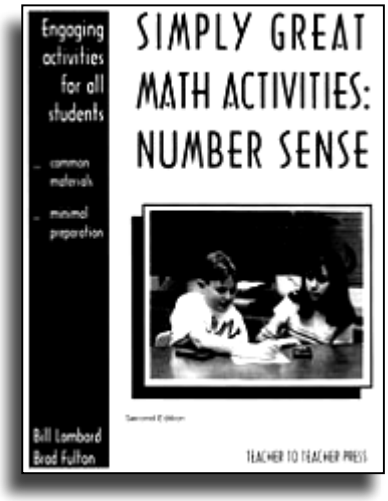
The Language of Math helps teachers create a classroom environment rich in mathematical thinking by showing them how to easily incorporate oral and written language into their math classes. Over 100 journal and discussion starters are included along with extensive instructions for making the most of your math time.



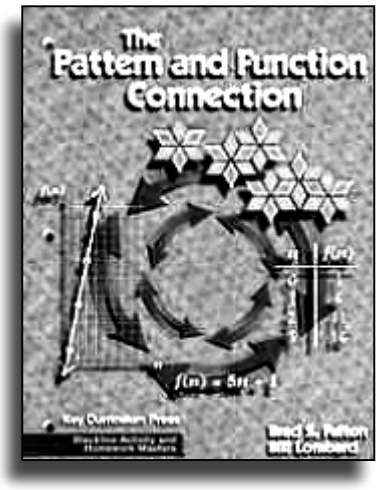
Here are a dozen unique and conceptual activities that will help your students add, subtract, multiply and divide fractions as well as connect them to decimal and percent representations. Both you and your students will love the novel and creative approach.



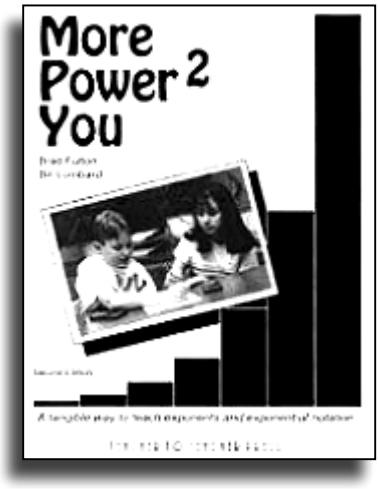
Teachers are raving about how effective these activities have been in their classrooms. Children as young as fourth grade and college students alike say that algebra is easy and makes sense because of this incredible approach.



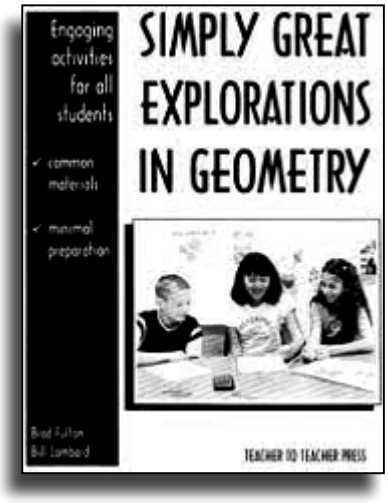
Students don't even think they are doing math sometimes because these activities are so fun and engaging, but they are developing rich and valuable number sense as they explore these eleven creative activities.



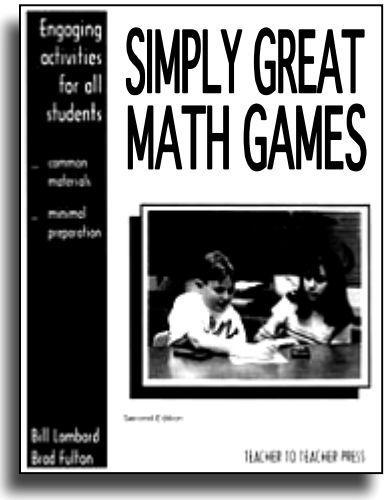
Our first book is still one of our most popular. Every teacher we talk to who has tried this approach to functions has been amazed at what their students have learned and accomplished. Over 150 pages of multiple representations of functions cover such concepts as slope, intercept, and function notation. Even elementary students have developed an understanding of functions with this book.



Exponents will finally make sense to your students after they participate in the unique activities found in this book. Both positive and negative exponents are demonstrated conceptually. Your students will even be able to explain *why* $n^0 = 1$.



Over one dozen geometry activities will excite your students as they discover the connections between geometry and fractions, decimals, percents, and even algebra. Area formulas, angle measurement, polygon attributes, vocabulary, and construction are covered.



A dozen engaging and educational games await you and your students in this creative and highly adaptable book. You'll find games that reinforce basic operations with whole numbers, fractions, decimals, and integers as well as algebraic skills. Game masters will serve a spectrum of grade levels and skill levels. Your students will beg for more!

Download *free* sample chapters at our website:

w w w . t t t p r e s s . c o m

Teacher to Teacher Press

"Building Mathematical Skill on a Foundation of Understanding"

SIMPLY GREAT MATH INSTRUCTIONAL DVDS ..... **New Product!**

You asked–we listened! Many of you have asked for DVDs of our activities showing how to implement these in your own classroom. Now you can get comprehensive modeling and support to make the most of your instructional time. Each DVD comes with downloadable PDF files of everything you need to teach the activity. You'll find four of our most popular lessons: "Menu Math", "The Power of Two," "Hundreds Magic," and "X Marks the Spot." Look for more titles to be added soon!

Simply Great Math Games

Conceptually rich yet easy activities to help your students learn to add and multiply integers and fractions, work with prime and composite numbers, apply principles of probability, graph, use order of operations, develop geometric vocabulary and skills, understand estimation and decimal place value, and much more!

Simply Great Math Activities: Number Sense

Eleven extensive ready-to-teach and mathematically rich activities will captivate your students' interest. Many of the activities can be extended into week-long explorations. The book includes homework masters, transparency masters, journal prompts and simple directions.

Simply Great Math Activities: Fractions, Decimals, and Percents

A dozen incredible and innovative activities will captivate and educate your students. They will learn creative and clever tricks that make fractions less frightening. The book includes homework and transparency masters, journal topics, easy-to-follow directions, and much more.

Simply Great Math Activities: Algebra Readiness

These motivating activities will work for young students just beginning to work on algebra concepts, while ideas for extensions make them just as appropriate for older students in formal algebra classes. The book includes homework ideas, transparency masters, journal prompts and simple directions.

Simply Great Math Activities: Geometry Explorations

Students use geometry as a tool to explore unique mathematical situations. Area formulas, volume, surface area, compass and straightedge constructions, angle measurement, the Pythagorean Theorem and more are covered in unique ways that promote deeper understanding. Algebraic principles and fraction concepts are embedded.

More Power^2 You!

A unit that actually makes the concept of exponents and exponential growth tangible! Lead your students on a journey traveling from physical and manipulative models to graphical and symbolic formats. They will even be able to explain why $n^0 = 1$. The book includes student worksheets, homework, teacher lessons, journal prompts, and ideas for extensions.

The Language of Math: Helping Students Speak, Write, and Think Mathematically

Everything you need to incorporate oral and written language into your classroom lessons, complete with easy tips for leading rich mathematical discussions, and great ideas for **easily** managing written work. There are over 70 transparency masters, 100 journal prompts, and masters for making your own math journals. Writing and speaking mathematically has never been easier!

The Pattern and Function Connection

This three-week unit is the easy and effective way to introduce students to linear functions. Students will move from physical and manipulative models to pictorial and graphical representations, then finally to symbolic expressions for linear equations. The book includes student worksheets, homework, teacher lessons, journal prompts, and ideas for extensions.

24 Pattern Cards

A fantastic supplement and great time saver! These full – color 11" by 17" cards are printed on heavy matte-finish card stock that is easy on the eyes and will stand up to years of student use. Students will enjoy working with the patterns so much, they won't notice how much they are learning about functions and algebra. They are a great companion to go with either of our titles: *The Pattern and Function Connection* or *Simply Great Math Activities: Algebra Readiness*.

Transparencies of Pattern Cards

Another great addition to *The Pattern and Function Connection* or *Simply Great Math Activities: Algebra Readiness* family of products. These brilliant transparencies are full – color representations of the Pattern Cards listed above. Use them for whole-class instruction to introduce the powerful mathematics of either book. The bright and clear colors will capture your students' interest, introduce them to the beauty of patterns, and send them well on their way to algebraic learning. Can be ordered separately or at a package discount with other Pattern and Function products.