

Math Games That Motivate And Educate

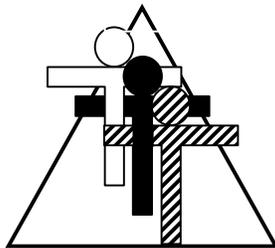
From *Simply Great Math Games* by TTT Press

By Brad Fulton

Educator of the Year

(Voted by the California League of Middle Schools – 2005)

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Brad Fulton

◆ Educator of the Year ◆

- ◆ Consultant
- ◆ Educator
- ◆ Author
- ◆ Keynote presenter
- ◆ Teacher trainer
- ◆ Conference speaker

Known throughout the country for motivating and engaging teachers and students, Brad has co-authored over a dozen books that provide easy-to-teach yet mathematically rich activities for busy teachers while teaching full time for over 30 years. In addition, he has co-authored over 40 teacher training manuals full of activities and ideas that help teachers who believe mathematics must be both meaningful and powerful.

- ◆ 2005 California League of Middle Schools Educator of the Year
- ◆ California Math Council and NCTM national featured presenter
- ◆ Lead trainer for summer teacher training institutes
- ◆ Trainer/consultant for district, county, regional, and national workshops

- ◆ Simply Great Math Activities series: six books covering all major strands
- ◆ Angle On Geometry Program: over 400 pages of research-based geometry instruction
- ◆ 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 conferences

All workshops provide participants with complete, ready-to-use activities that require minimal preparation and give clear and specific directions. Participants also receive journal prompts, homework suggestions, and ideas for extensions and assessment.

Brad's math activities are the best I've seen in 38 years of teaching!

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

"I can't begin to tell you how much you have inspired me!"

Sue Bonesteel, Math Dept. Chair, Phoenix, AZ

"Your entire audience was fully involved in math!! When they chatted, they chatted math. Real thinking!"

Brenda McGaffigan, principal, Santa Ana, CA

"Absolutely engaging. I can teach algebra to second graders!"

Lisa Fellers, teacher

◆
References available upon request
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of the paper clips may be moved to a new factor. However, it is permissible to move the two paper clips to the same factor to claim a square number. For example, in step four above, the second player could have moved the clip from the seven to the negative five. This would put both clips on negative five and the player could take positive 25.

$$-5 \times -5 = 25$$

- 6 Once a product has been taken with an “x” or an “o”, it may not be used again.



Journal Prompts:



A team has asked for your advice. Their *opponent* can win by covering the positive 36. Tell them which moves would be good ones and which moves they should avoid. Explain your reasoning to them.

Homework:



Give students eight factors or let them choose their own. Have them fill in a six by six grid with the products. These individual game boards can be used to play the game in class the next day.

Taking a Closer Look: ✚

You can make custom game boards using fractions, decimals, and percents to combine the practice of these concepts with integers. You could also mix fractions with whole numbers.

For an advanced game, introduce values for x and y , then put the products of the factors in the game board. For example, if we let $x = 3$, and $y = -2$, then:

$$(x + 1)(y - 1) = (3 + 1)(-2 - 1) = (4)(-3) = -12.$$

In this case, the product -12 should appear in the game board.

Good Tip!



Students can play this game in pairs or teams. Different teams can then use factors that are appropriate to their skill level.

Assessment:



As students play their homework game boards in class the following day, their dialogue during the game will lead them to discover and correct their errors.

Four-in-a-Row: Whole Numbers

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

42	70	110	30	132	88
72	99	36	81	50	56
121	25	108	55	84	54
45	80	72	144	49	64
90	66	48	35	63	40
77	120	60	96	60	100

5 6 7 8 9 10 11 12

Four-in-a-Row: Decimals

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

1.2	5	.88	.011	.003	.25
100	.008	.09	.005	.006	6
3.2	.24	.48	.04	.64	16
2.4	.4	2	4.4	.15	1.21
.55	.36	.18	.3	.0001	.33
11	40	.1	8	3	.66

.3 4 .5 .01 .6 .8 10 1.1

Four-in-a-Row: Fractions

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

$\frac{2}{9}$	$\frac{2}{15}$	$\frac{1}{10}$	$\frac{9}{16}$	$\frac{1}{20}$	$\frac{3}{20}$
$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{10}$	$\frac{4}{15}$
$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{25}$	$\frac{1}{15}$	1	$\frac{3}{8}$
$\frac{1}{6}$	$1\frac{1}{3}$	$\frac{4}{25}$	$\frac{1}{2}$	$\frac{2}{5}$	$\frac{2}{3}$
$\frac{1}{10}$	$\frac{1}{3}$	4	$\frac{1}{6}$	$\frac{2}{15}$	$\frac{1}{8}$
$\frac{4}{9}$	$\frac{2}{25}$	$\frac{1}{12}$	$\frac{4}{5}$	$1\frac{1}{2}$	$\frac{1}{9}$

$\frac{2}{5}$ $\frac{1}{2}$ $\frac{2}{3}$ 2 $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{3}$ $\frac{3}{4}$

Four-in-a-Row: Percents

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

9.6	4800	7.5%	7.2	37.5	4%
60	2.5%	20	2500	5184	7680
72	12.5	6400	5%	18	56.25%
6912	14.4	1%	19.2	5760	24
18.75%	10	9216	16	6.25%	5
8	4000	54	15%	3600	2%

80 72 50 96
 10% 20% 25% 75%

Four-in-a-Row: Inegers

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

-42	70	-110	-30	-132	-88
-72	-99	36	81	50	56
121	25	108	-55	84	-54
45	80	72	144	49	64
90	66	-48	35	63	40
-77	120	60	96	-60	100

-5 6 -7 -8 -9 -10 11 -12

Four-in-a-Row: Two-Digit Numbers

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

1600	612	5049	252	1320	1190
196	2079	441	1071	462	9801
840	2805	144	480	2601	3400
4335	714	2040	1089	7225	1020
396	3960	560	1386	1785	294
693	3267	1188	8415	168	1683

12 14 21 33 40 51 85 99

Four-in-a-Row: Monomials

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

$-2x^2$	y^2	$-x$	4	$4x^2$	$2y$
$-y$	$4x$	2	$-4xy$	1	-2
-4	$2y^2$	x^2	$-2y$	$-4x$	$2x$
-2	$-4y$	4	x	$-2xy$	-1
$2xy$	$4y^2$	$2x$	1	$-2x$	y
$-2y$	$-2x$	2	$2y$	$4y$	xy



Four-in-a-Row: Binomials

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

$\underline{x^2-4x+4}$	$4x^2-4x+1$	$\underline{-x^2-5x-6}$	$\underline{x^2-6x+9}$	$\underline{x^2+5x+6}$	$\underline{x^2-9}$
$4x^2+4x+1$	$2x^2+5x+2$	$4x^2+4x-3$	$2x^2-5x+2$	$\underline{-x^2+4}$	$2x^2-3x-9$
$2x^2+7x+6$	$-2x^2-7x-6$	$\underline{x^2+4x+4}$	$\underline{x^2+x-6}$	$-2x^2-5x-2$	$\underline{-x^2-4x-4}$
$2x^2-7x+3$	$2x^2-3x-2$	$4x^2-1$	$2x^2+5x-3$	$2x^2-5x-3$	$2x^2+9x+9$
$\underline{x^2-x-6}$	$\underline{x^2+6x+9}$	$2x^2-x-6$	$\underline{-x^2+x+6}$	$\underline{x^2-4}$	$4x^2+8x+3$
$4x^2+12x+9$	$2x^2+7x+3$	$\underline{x^2+4x+4}$	$2x^2+3x-2$	$-2x^2-3x+2$	$\underline{x^2-5x+6}$

$$\underline{x+2}$$

$$\underline{x-3}$$

$$\underline{x-2}$$

$$\underline{-x-2}$$

$$2x+1$$

$$2x-1$$

$$2x+3$$

$$\underline{x+3}$$

Four-in-a-Row

Rules:

1. Team one picks two factors by marking them with paper clips. Place an “X” on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

The Tax Collector

Rules:

1. You, the taxpayer, can choose any number you want from the bank. I, the tax collector, get to add all the factors of your number to my score.
2. You cannot take a number from the bank without paying taxes.
3. The tax collector gets any numbers you don't take.

Taxpayer	Tax Collector

Factor Bank			
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

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5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24

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Taxpayer	Tax Collector

