

Dusting off the Checkerboard

AMS Conference - Boston 2004

“Dusting off the Checkerboard” is an interactive presentation that involves using colored squares to construct a checkerboard to enhance the elementary student’s understanding of the multiplication process and place value. Participants will also use the checkerboard for Cross Multiplication before abstractly multiplying binomials, trinomials, and even quadrinomials!

“Dusting off the Checkerboard” Outline

- I. Introduction
 - A. Purpose of Mathematics Education
 - B. Mathematical Mind
 - C. Seeing patterns
 - D. Understanding multiplication
 - E. Getting a sense of place value
- II. Presentation
 - A. Single Digit Multiplication
 - B. Double Digit
- III. Building a Checkerboard
- IV. Cross Multiplication
 - A. Binomial
 1. Checkerboard
 - a. First Passage
 - b. Second Passage
 - c. Third Passage
 2. Abstraction
 - B. Trinomial
 - C. Quadrinomial
- V. Lattice Multiplication

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units X units

units

units X tens

tens

units X hundreds

hundreds

tens X units

tens

tens X tens

hundreds

tens X hundreds

thousands

hundreds X units

hundreds

hundreds X tens

thousands

hundreds X hundreds

ten thousands

thousands X units

thousands

thousands X tens

ten thousands

thousands X hundreds

hundred thousands

ten thousands X units

ten thousands

ten thousands X tens

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ten thousands X hundreds

millions

hundred thousands X units

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millions

hundred thousands X hundreds

ten millions

units X thousands

thousands

units X ten thousands

ten thousands

units X hundred thousands

hundred thousands

tens X thousands

ten thousands

tens X ten thousands

hundred thousands

tens X hundred thousands

millions

hundreds X thousands

hundred thousands

hundreds X ten thousands

millions

hundreds X hundred thousands

ten millions

thousands X thousands

millions

thousands X ten thousands

ten millions

thousands X hundred thousands

hundred millions

ten thousands X thousands

ten millions

ten thousands X ten thousands

hundred millions

**ten thousands X hundred
thousands**

billions

hundred thousands X thousands

hundred millions

**hundred thousands X ten
thousands**

billions

**hundred thousands X hundred
thousands**

ten billions

units X millions

millions

millions X units

millions

millions X millions

trillions

tens X millions

ten millions

millions X tens

ten millions

tens

hundreds X millions

hundred millions

millions X hundreds

hundred millions

hundreds

thousands X millions

billions

millions X thousands

billions

thousands

ten thousands X millions

ten billions

millions X ten thousands

ten billions

ten thousands

hundred thousands X millions

hundred billions

millions X hundred thousands

hundred billions

hundred thousands

1 X 1

1

1 X 10

10

1 X 100

100

10 X 1

10

10 X 10

100

10 X 100

1,000

100 X 1

100

100 X 10

1,000

100 X 100

10,000

1,000 X 1

1,000

1,000 X 10

10,000

1,000 X 100

100,000

10,000 X 1

10,000

10,000 X 10

100,000

10,000 X 100

1,000,000

100,000 X 1

100,000

100,000 X 10

1,000,000

100,000 X 100

10,000,000

1 X 1,000

1,000

1 X 10,000

10,000

1 X 100,000

100,000

10 X 1,000

10,000

10 X 10,000

100,000

10 X 100,000

1,000,000

100 X 1,000

100,000

100 X 10,000

1,000,000

100 X 100,000

10,000,000

1,000 X 1,000

1,000,000

1,000 X 10,000

10,000,000

1,000 X 100,000

100,000,000

10,000 X 1,000

10,000,000

10,000 X 10,000

100,000,000

10,000 X 100,000

1,000,000,000

100,000 X 1,000

100,000,000

100,000 X 10,000

1,000,000,000

100,000 X 100,000

10,000,000,000

1 X 1,000,000
1,000,000

1,000,000 X 1
1,000,000

1,000,000 X 1,000,000
1,000,000,000,000

10 X 1,000,000
10,000,000

1,000,000 X 10
10,000,000

100 X 1,000,000
100,000,000

1,000,000 X 100
100,000,000

1,000 X 1,000,000
1,000,000,000

1,000,000 X 1,000
1,000,000,000

10,000 X 1,000,000
10,000,000,000

1,000,000 X 10,000
10,000,000,000

100,000 X 1,000,000
100,000,000,000

1,000,000 X 100,000
100,000,000,000

units X units
units

units X tenths
tenths

units X hundredths
hundredths

tens X units
tens

tens X tenths
units

tens X hundredths
tenths

hundreds X units
hundreds

hundreds X tenths
tens

hundreds X hundredths
units

thousands X units
thousands

thousands X tenths
hundreds

thousands X hundredths
tens

ten thousands X units
ten thousands

ten thousands X tenths
thousands

ten thousands X hundredths
hundreds

hundred thousands X units
hundred thousands

hundred thousands X tenths
ten thousands

**hundred thousands X
hundredths**
thousands

units X thousandths
thousandths

units X ten thousandths
ten thousandths

units X hundred thousandths
hundred thousandths

tens X thousandths
hundredths

tens X ten thousandths
thousandths

tens X hundred thousandths
ten thousandths

hundreds X thousandths
tenths

hundreds X ten thousandths
hundredths

hundreds X hundred thousandths
thousandths

thousands X thousandths
units

thousands X ten thousandths
tenths

thousands X hundred thousandths
hundredths

ten thousands X thousandths
tens

ten thousands X ten thousandths
units

ten thousands X hundred thousandths
tenths

hundred thousands X thousandths
hundreds

hundred thousands X ten thousandths
tens

hundred thousands X hundred thousandths
units

units X millionths
millionths

millions X units
millions

millions X millionths
units

tens X millionths
hundred thousandths

millions X tenths
hundred thousands

units

these labels for regular checkerbd

hundreds X millionths
ten thousandths

millions X hundredths
ten thousands

millions

thousands X millionths
thousandths

millions X thousandths
thousands

units

ten thousands X millionths
hundredths

millions X ten thousandths
hundreds

tens

hundred thousands X millionths
tenths

millions X hundred thousandths
tens

hundreds

thousands

hundreds

tenths

ten thousands

thousands

hundredths

hundred thousands

ten thousands

thousandths

millions

hundred thousands

ten thousandths

following for decimal checkerbd

units

millions

hundred thousandths

tens

units

millionths

1 X 1
1

1 X 0.1
0.1

1 X 0.01
0.01

10 X 1
10

10 X 0.1
1

10 X 0.01
0.1

100 X 1
100

100 X 0.1
10

100 X 0.01
1

1,000 X 1
1,000

1,000 X 0.1
100

1,000 X 0.01
10

10,000 X 1
10,000

10,000 X 0.1
1,000

10,000 X 0.01
100

100,000 X 1
100,000

100,000 X 0.1
10,000

100,000 X 0.01
1,000

1 X 0.001
0.001

10 X 0.001
0.01

100 X 0.001
0.1

1,000 X 0.001
1

10,000 X 0.001
10

100,000 X 0.001
100

1 X 0.0001
0.0001

10 X 0.0001
0.001

100 X 0.0001
0.01

1,000 X 0.0001
0.1

10,000 X 0.0001
1

100,000 X 0.0001
10

1 X 0.00001
0.00001

10 X 0.00001
0.0001

100 X 0.00001
0.001

1,000 X 0.00001
0.01

10,000 X 0.00001
0.1

100,000 X 0.00001
1

1 X 0.000001

0.000001

1,000,000 X 1

1,000,000

1,000,000 X 0.000001

1

10 X 0.000001

0.00001

1,000,000 X 0.1

100,000

100 X 0.000001

0.0001

1,000,000 X 0.01

10,000

1,000 X 0.000001

0.001

1,000,000 X 0.001

1,000

10,000 X 0.000001

0.01

1,000,000 X 0.0001

100

100,000 X 0.000001

0.1

1,000,000 X 0.00001

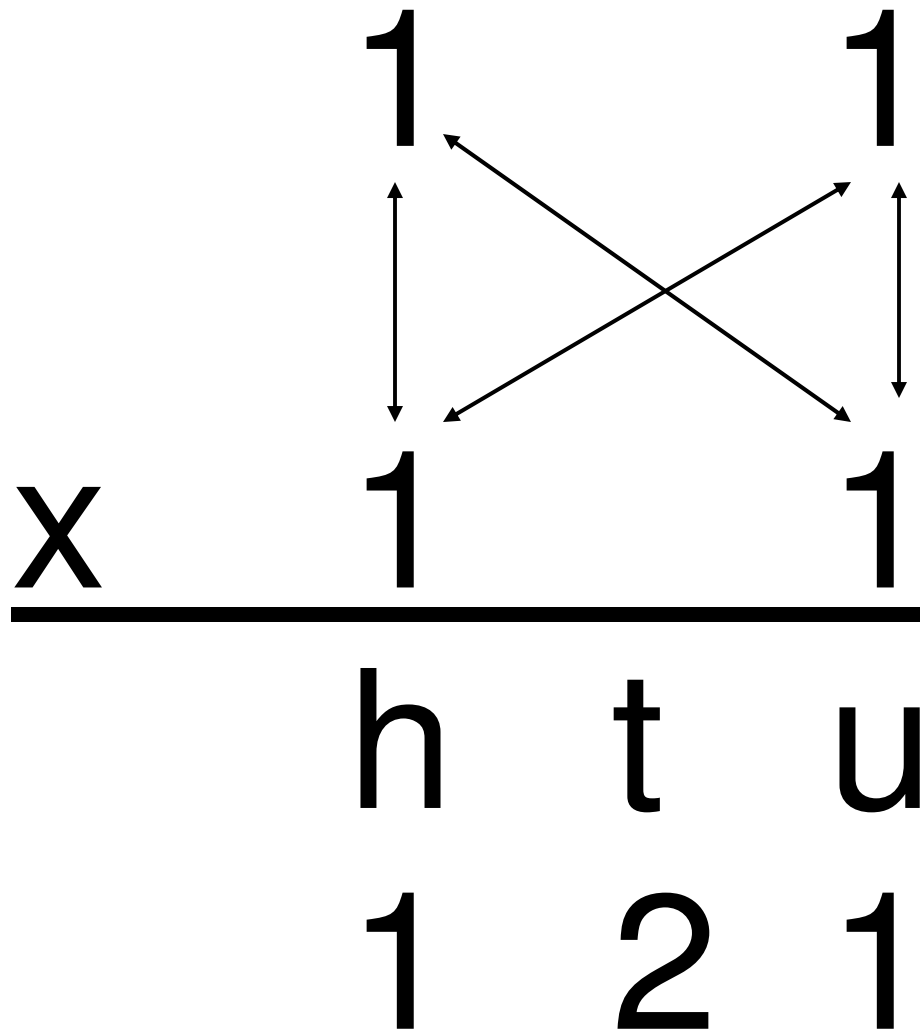
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Multiplication Checkerboard

Multiplication Checkerboard

							millions	1,000,000
							hundred thousands	100,000
							ten thousands	10,000
							thousands	1,000
							hundreds	100
							tens	10
							units	1
millions	hundred thousands	ten thousands	thousands	hundreds	tens	units		
1,000,000	100,000	10,000	1,000	100	10	1		

Cross Multiplication Chart - Binomial



Cross Multiplication Chart - Trinomial

