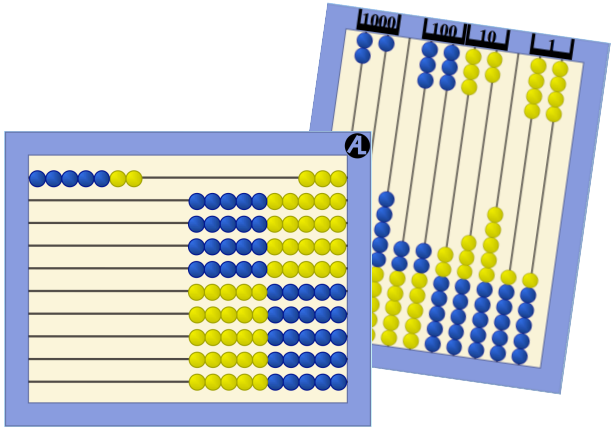
RIGHTSTART™ MATH:

Why it Works!



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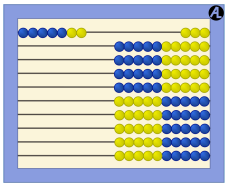
- Montessori Educator
- Math Games Author
- Special Needs Teacher
- AL Abacus Designer
- Middle-School Teacher
- Ph.D. in Math Education
  from University of Minnesota

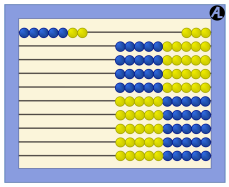
AL Abacus



"The role of physical manipulatives is to help the child form those visual images and thus to eliminate the need for the physical manipulatives."

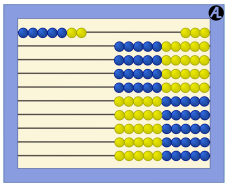
—Ginsberg and others

AL Abacus



- Visual and tactile manipulative
- Develops mental images of
  - Quantities
  - Strategies
  - Mathematical Operations

AL Abacus

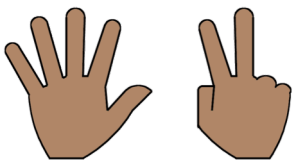


"Think in pictures, because the brain remembers images better than it does anything else."

—Ben Pridmore
World Memory Champion, 2009

Subitizing

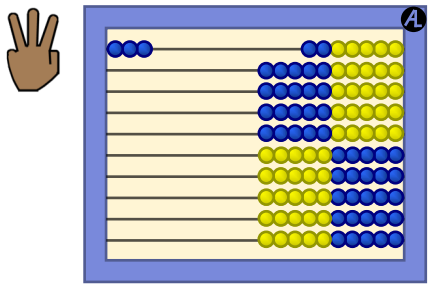
- Subitizing is quick recognition of quantity without counting.



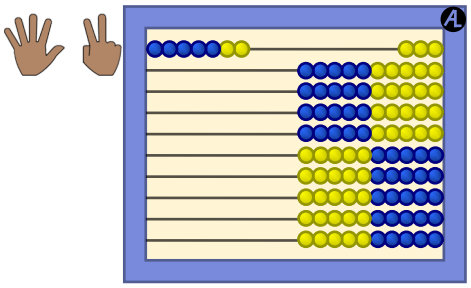
Grouping

Try to visualize 8 apples without grouping.

Entering Quantities

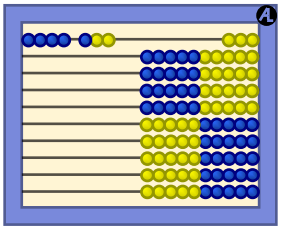


Entering Quantities

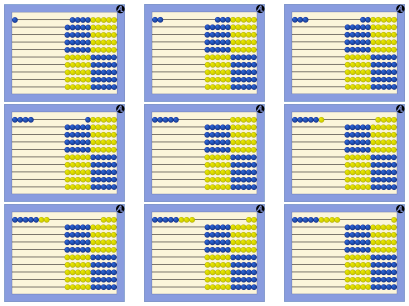


Adding

4 + 3 = ___



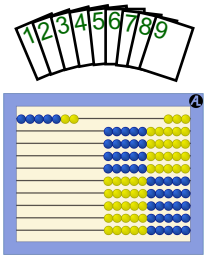
Facts Equaling 10



Go to the Dump Game

A "Go Fish" type of game where the pairs are:

1 & 9
2 & 8
3 & 7
4 & 6
5 & 5



Why Games

$$\frac{\text{Games}}{\text{Math}} = \frac{\text{Books}}{\text{Reading}}$$

Games provide interesting repetition needed for automatic responses in a social setting.

More importantly, games provide an application for the new information!

Place Value

- The author of *Treviso Arithmetic of 1478*, written over 500 years ago, considered place value so important that it was listed first among the "five" operations of arithmetic.
- Place value organizes numbers into neat packets.
- Without place value, computational algorithms make little sense.

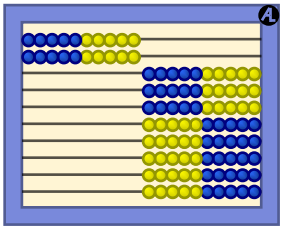
Place Value

Children often think of 14
as 14 ones,
not ten and 4 ones.

The pattern that is needed to make sense of tens and ones is hidden because of the English language!

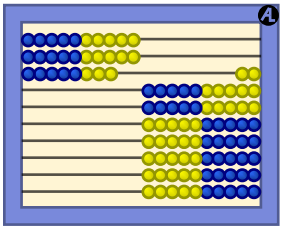
Transparent Place Value

2-ten



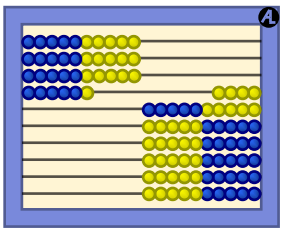
Transparent Place Value

2-ten 8



Transparent Place Value

3-ten 6



Transparent Number Naming

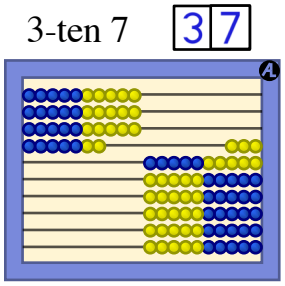
10 = ten	20 = 2-ten
11 = ten 1	21 = 2-ten 1
12 = ten 2	22 = 2-ten 2
13 = ten 3	23 = 2-ten 3
14 = ten 4	. . . .
. . . .	. . . .
19 = ten 9	99 = 9-ten 9

Transparent Number Naming

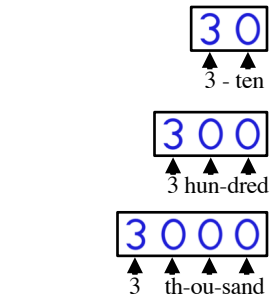
- Use this for two reasons:
  1. Patterning
  2. Place value

Transparent Number Naming

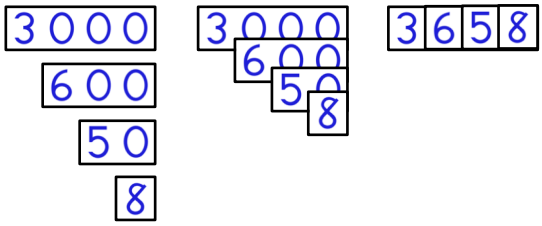
3-ten 7



Transparent Number Naming



Transparent Number Naming



Transparent Number Naming

- Just as reciting the alphabet doesn't teach reading, counting doesn't teach arithmetic.
- Just as we first teach the *sound* of the letters, we first teach the *name* of the quantity (math way).

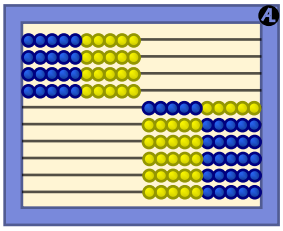
Transparent Number Naming

- Asian children learn mathematics using the math way of number naming.
- They understand place value in first grade; only half of U.S. children understand place value at the end of fourth grade.
- Mathematics is the science of patterns. The patterned math way of number naming greatly helps children learn number sense.

Traditional Names

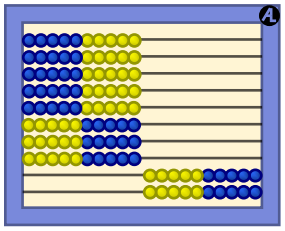
4-ten = forty

ten = ty



Traditional Names

8-ten = eighty



Traditional Names

A word game

fireplace → place-fire

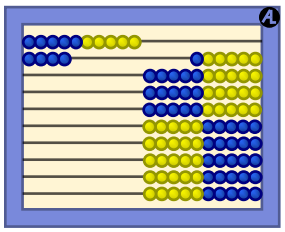
newspaper → paper-news

box-mail → mailbox

Traditional Names

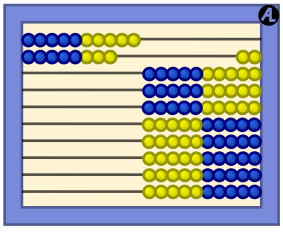
ten 4 → teen 4 → fourteen

ten = teen



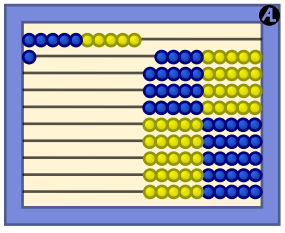
Traditional Names

ten 8 → teen 8 → eighteen



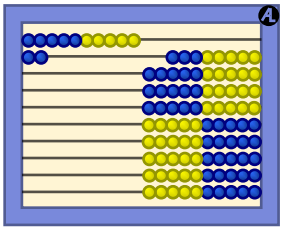
Traditional Names

a one left → a left-one → eleven



Traditional Names

two left → twelve



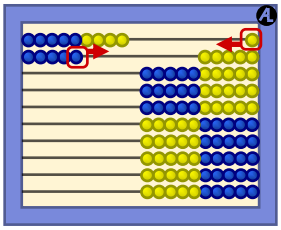
Strategies

A strategy is a way to learn a new fact or recall a forgotten fact.

A visual representation is a powerful strategy.

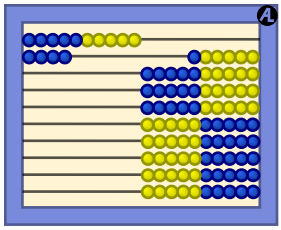
Strategy: Complete the Ten

9 + 5 = ___



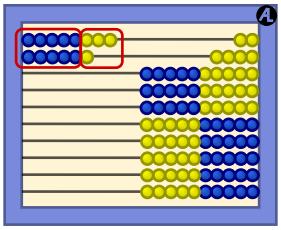
Strategy: Complete the Ten

9 + 5 = 14



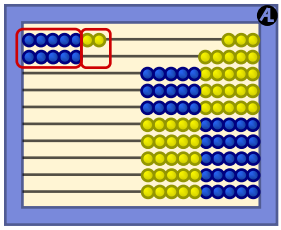
Strategy: Two Fives

8 + 6 = 14



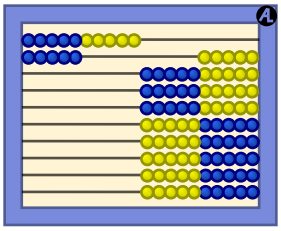
Strategy: Two Fives

7 + 5 = 12



Strategy: Part from Ten

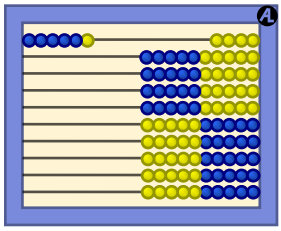
15 – 9 = ___



Subtract 5, then 4

Strategy: Part from Ten

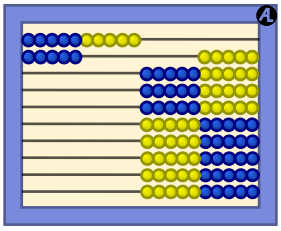
15 – 9 = 6



Subtract 5, then 4

Strategy: All from Ten

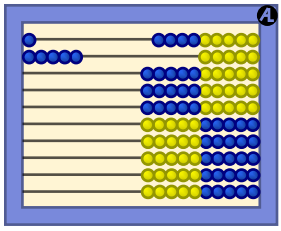
15 – 9 = ___



Subtract 9 from the 10

Strategy: All from Ten

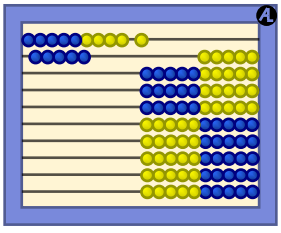
15 – 9 = 6



Subtract 9 from the 10

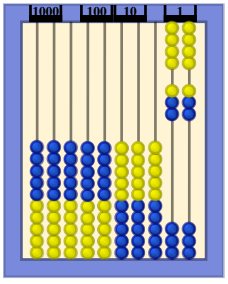
Strategy: Going Up

15 – 9 = 6



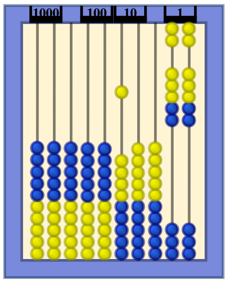
Start at 9; go up to 15

AL Abacus: Side 2



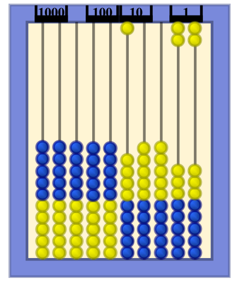
8
+ 6

AL Abacus: Side 2



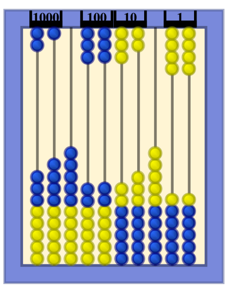

```
   8
+  6
  14
```


AL Abacus: Side 2



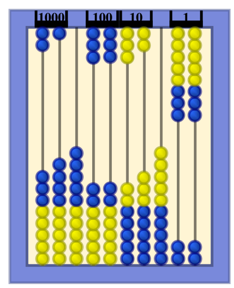

```
   8
+  6
  14
```


Adding 4-Digit Numbers



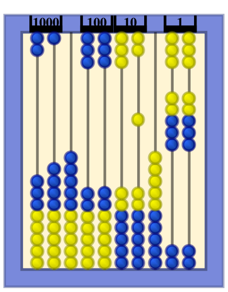

```
   3658
+  2738
```


Adding 4-Digit Numbers



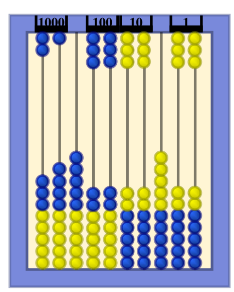

```
   3658
+  2738
```


Adding 4-Digit Numbers



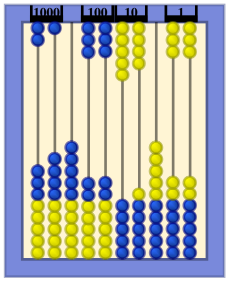

```
   3658
+  2738
```


Adding 4-Digit Numbers



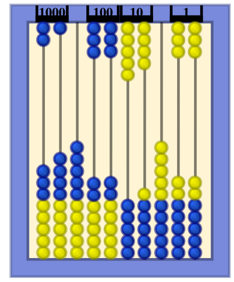

```
      1
   3658
+  2738
      6
```

Adding 4-Digit Numbers



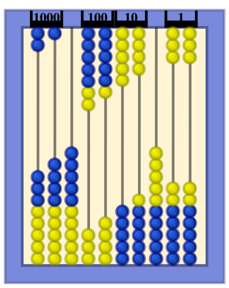
1
3658
+ 2738
6

Adding 4-Digit Numbers



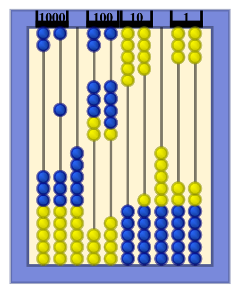
1
3658
+ 2738
96

Adding 4-Digit Numbers



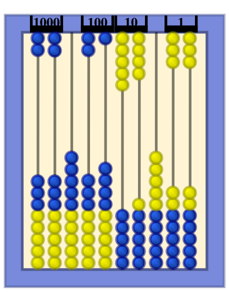
1
3658
+ 2738
96

Adding 4-Digit Numbers



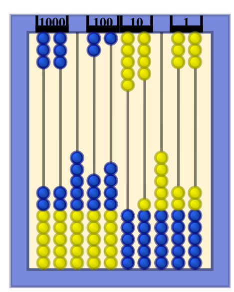
1
3658
+ 2738
96

Adding 4-Digit Numbers



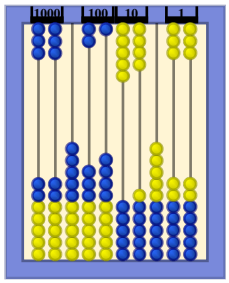
1 1
3658
+ 2738
396

Adding 4-Digit Numbers



1 1
3658
+ 2738
396

Adding 4-Digit Numbers



$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ } \\ 3658 \\ +\ 2738 \\ \hline 6396 \end{array}$$

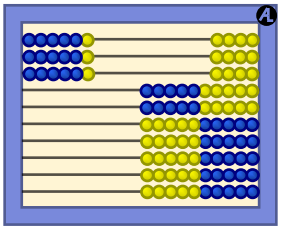
Adding 4-Digit Numbers

Most children who learn to add on the AL Abacus transition to the paper and pencil algorithm without further instruction.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ } \\ 3658 \\ +\ 2738 \\ \hline 6396 \end{array}$$

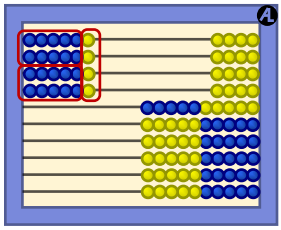
Multiplication

6 taken 3 times; 6 × 3



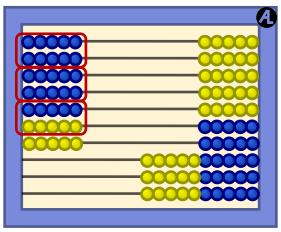
Multiplication

6 taken 4 times; 6 × 4



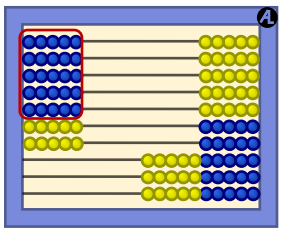
Multiplication

5 × 7



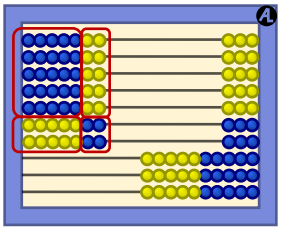
Multiplication

5 × 7



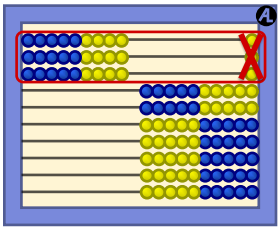
Multiplication

$7 \times 7 = 49$



Multiplication

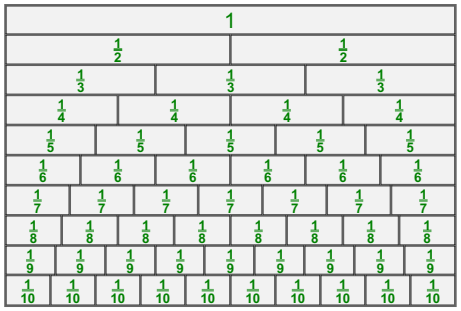
$9 \times 3 = 30 - 3 = 27$



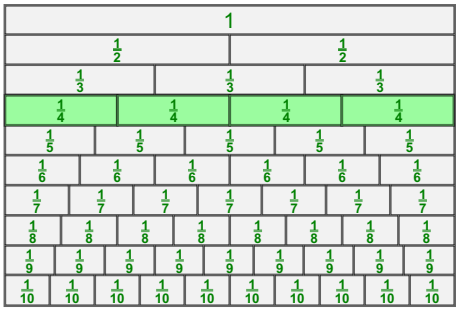
Ring Around the Product Game

2	6	3	5	1
8	54	12	42	7
5	50	15	9	8
9	1	6	8	3

Fraction Model: Linear Chart

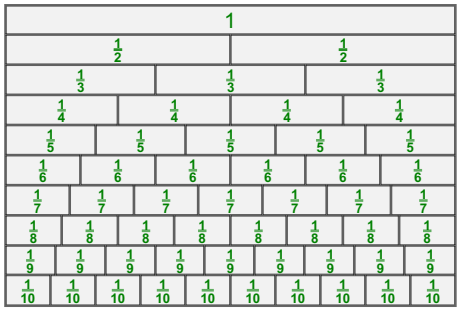


Fraction Model: Linear Chart



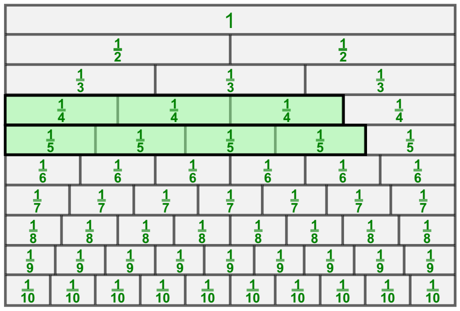
How many fourths in a whole?

Fraction Model: Linear Chart



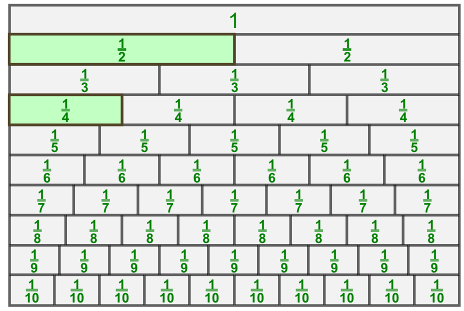
How many fourths in a whole? How many fifths? Eighths?

Fraction Chart



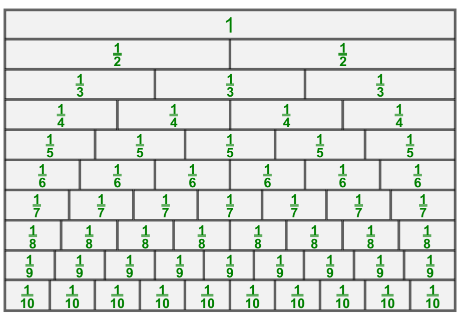
Which is more, 3/4 or 4/5?

Fraction Chart



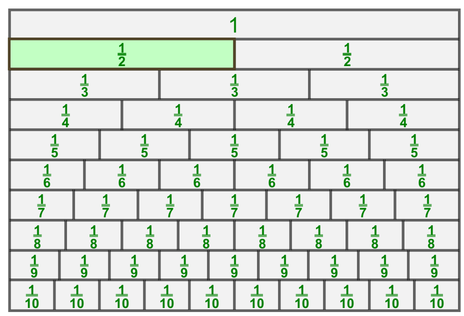
What is $\frac{1}{2}$ of $\frac{1}{2}$?

Fraction Chart



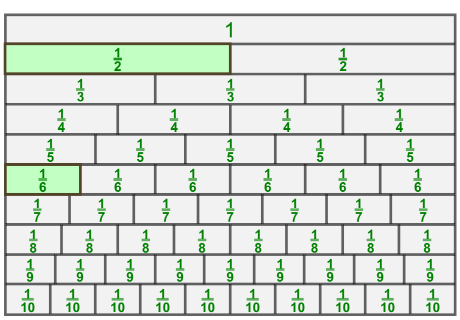
What is $\frac{1}{3}$ of $\frac{1}{2}$?

Fraction Chart



What is $\frac{1}{3}$ of $\frac{1}{2}$?

Fraction Chart



What is $\frac{1}{3}$ of $\frac{1}{2}$? That's multiplying fractions!

Effective Math Users

"…The now well established fact that those who are mathematically effective in daily life seldom make use 'in their heads' of the standard written methods which are taught in the classroom."

W. H. Cockroft, 1982

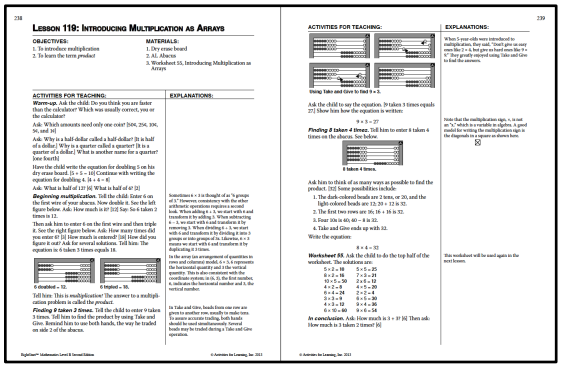
eminent mathematics educator in England

RightStart™ Mathematics

RightStart™ Mathematics

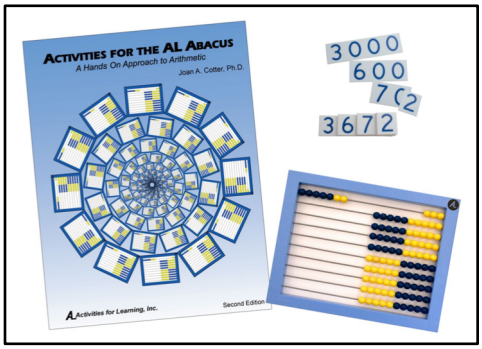
- Uses the abacus to develop visualization.
- Teaches topics in different ways with different approaches.
- Fractions are presented in a linear format.
- Games are the practice and review.
- Uses over 20 different manipulatives.
- Arranged in levels rather than grades.

RightStart™ Mathematics



Lesson 119: Introducing Multiplication as Arrays

RightStart™ Tutoring



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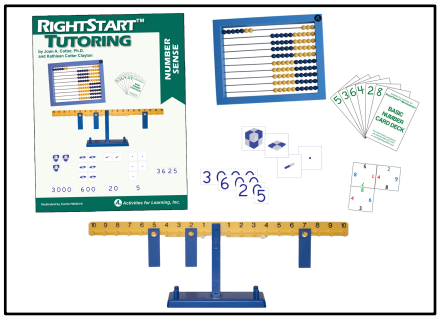

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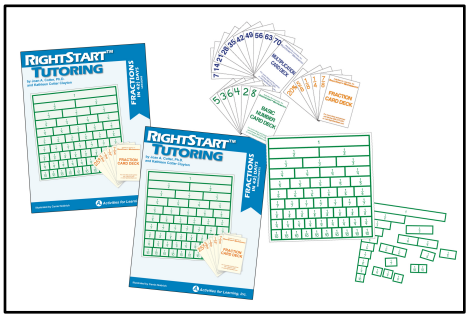

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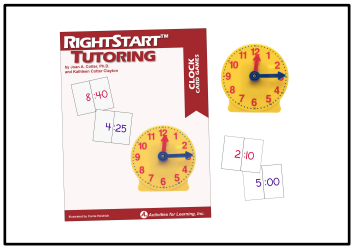

RightStart™ Tutoring

In Conclusion …

Our goal as a teacher of mathematics
is to help our children transform,
expand, and refine these beginning ideas
into deeper mathematical thinking.

– Dr. Joan A. Cotter