Mom,

Don’t Make Me Think –

Just Tell Me the Answer

Mom,
Don't Make Me Think –
Just Tell Me the Answer

VaHomeschoolers Conference and Resource Fair

Saturday, Session 1, 9:00–10:00 am

presented by Kathleen Cotter Lawler

based on the work of Dr. Joan A. Cotter

Mathematics

"Mathematics is a very broad and multi-dimensional subject that requires reasoning, creativity, connection making and interpretation of methods.

Math problems should encourage and acknowledge the different ways in which people see mathematics and the different pathways they take to solve problems."

Jo Boaler, Mathematics Mindsets

What about Memorization?

"Good mathematics learners expect to be able to make sense out of rules they are taught, and they apply some energy and time to the task of making sense.

By contrast, those less adept in mathematics try to memorize and apply the rules that are taught, but do not attempt to relate these rules to what they know about mathematics at a more intuitive level."

Lauren Resnick
--educational psychologist

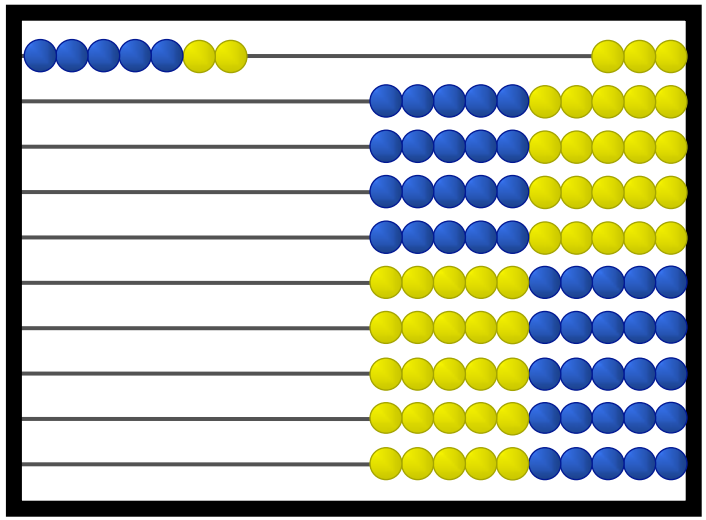
Time Needed to Memorize

According to a study with college students, it took them:

- 93 minutes to learn 200 nonsense syllables.
- 24 minutes to learn 200 words of prose.
- 10 minutes to learn 200 words of poetry.

We must tell our children that they need to understand math.

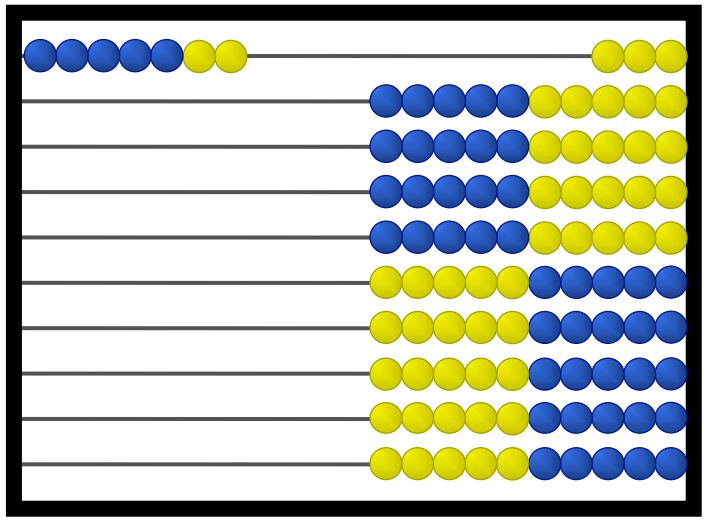
Abacus



"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*

Abacus



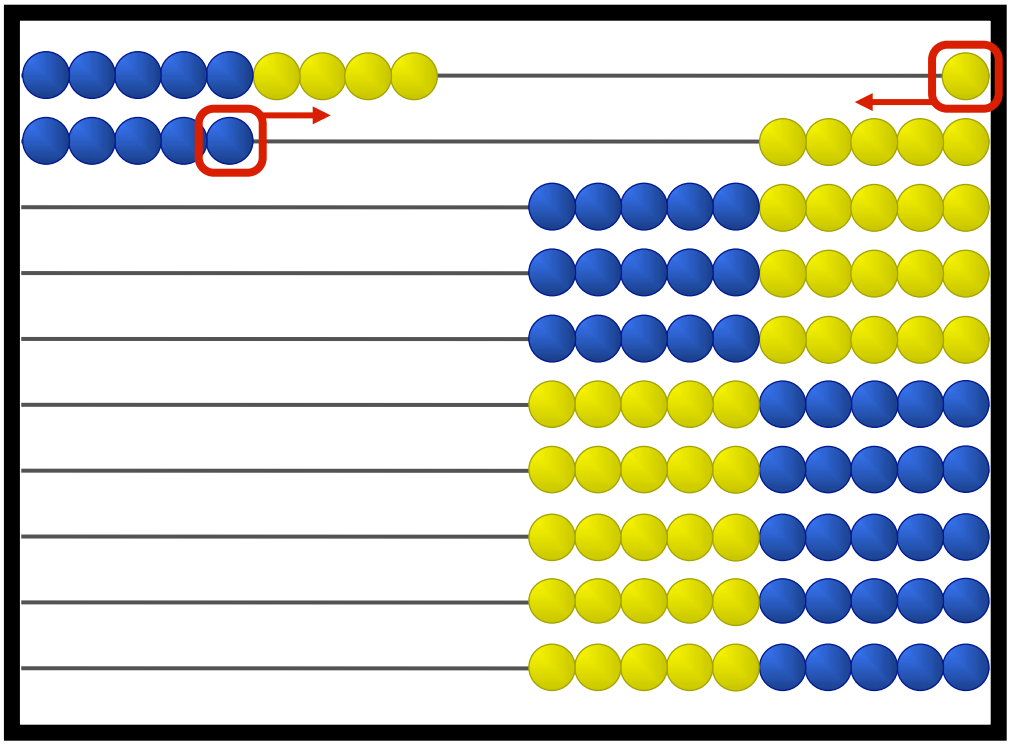
- Visual and tactile manipulative
- Promotes subitizing
- Develops mental images of
  - Quantities
  - Strategies
  - Mathematical Operations

Strategies

- A strategy is a way to learn a new fact or recall a forgotten fact.
- A visual representation is a powerful strategy.

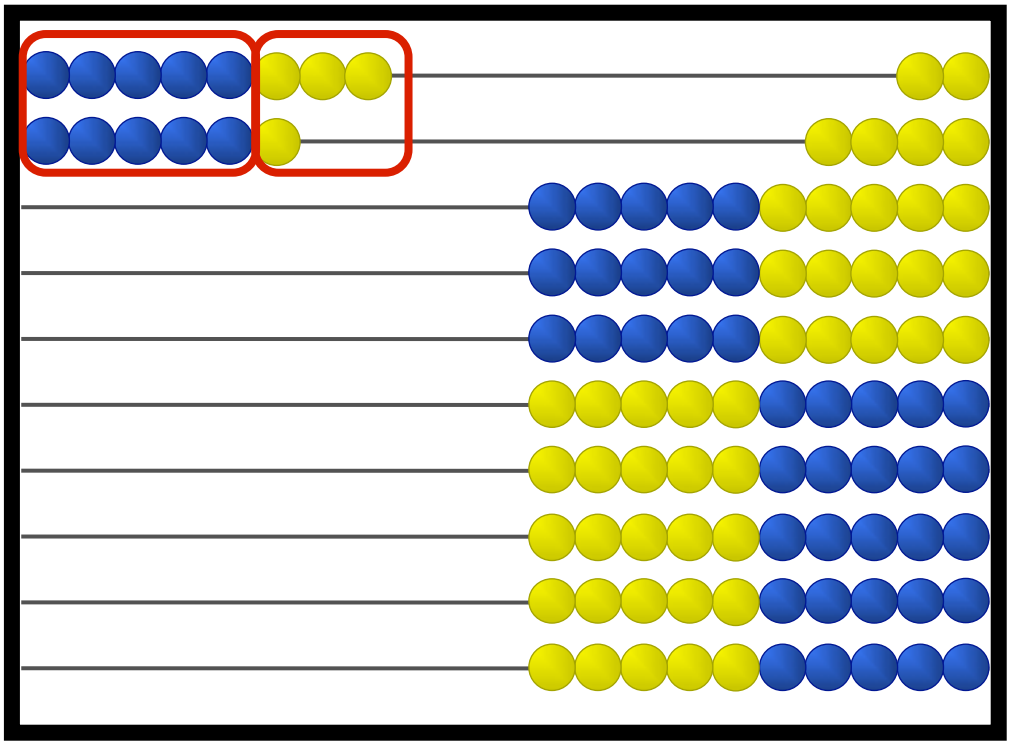
Strategy: Complete the Ten

$9 + 5 = \_\_\_\_$

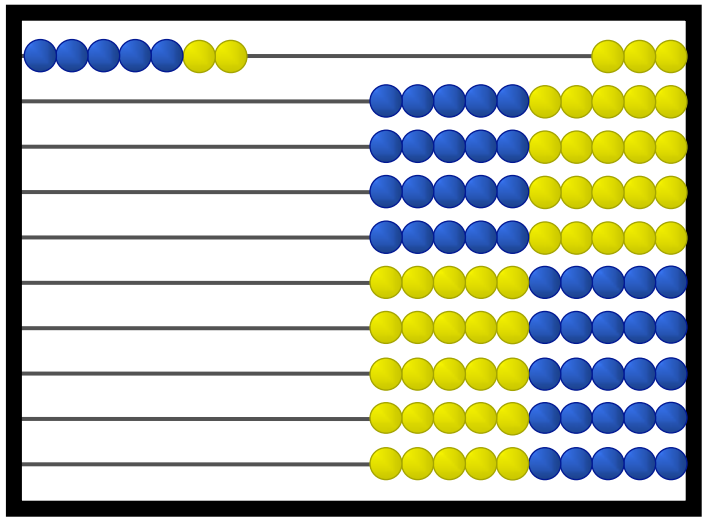


Strategy: Two Fives

$$8 + 6 = 10 + 4 = 14$$



Abacus



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

—Ben Pridmore
World Memory Champion, 2009

How to Assist Thinking

How did you get your answer?

Why did that work?

Will that work every time?

Be quiet!

Allow processing and thinking time.

Problem Solving

A problem is not a problem if the solution is obvious.

Don't have the child look for "key" words.

> *There are 76 tiles per box and we bought 38 boxes. How many tiles do we have* ***altogether****?*

Using "key words" as a problem solving strategy turns an opportunity to THINK into just another procedure to follow, masking understanding.

Problem Solving

- is NOT rote memorizing
- is NOT following rules blindly
- is NOT passive learning

Problem Solving

Problem solving is:

- thinking carefully about the situation
- discovering what is given
- figuring out what is needed
- and deciding on methods to get there

Problem Solving

Japanese teachers discuss one problem in depth, rather than four problems superficially.

They encourage multiple solutions.

Wrong solutions are discussed.

If an error isn't addressed, it will happen again. And again and again!

Guided Discovery

To encourage and guide the child to discovery. And to get them to think.

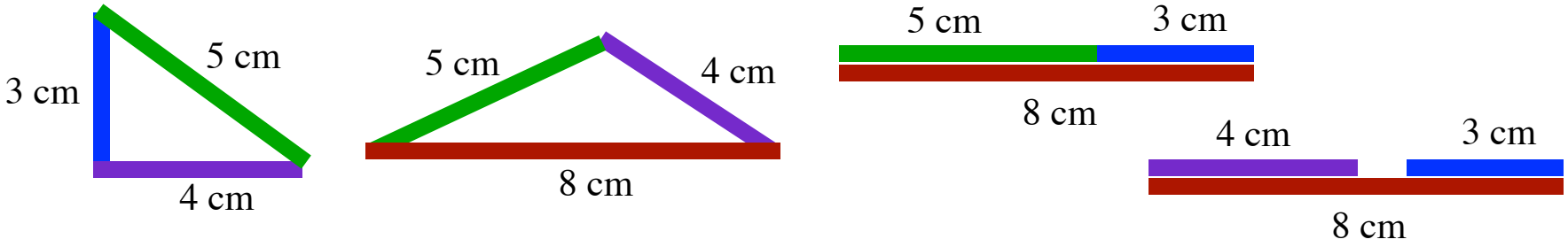
Ask questions, encouraging the child to find the “trick” or “secret pattern”.

It is vitally important that children think about what they are doing and not be satisfied with memorizing a rule.

This promotes critical thinkers!

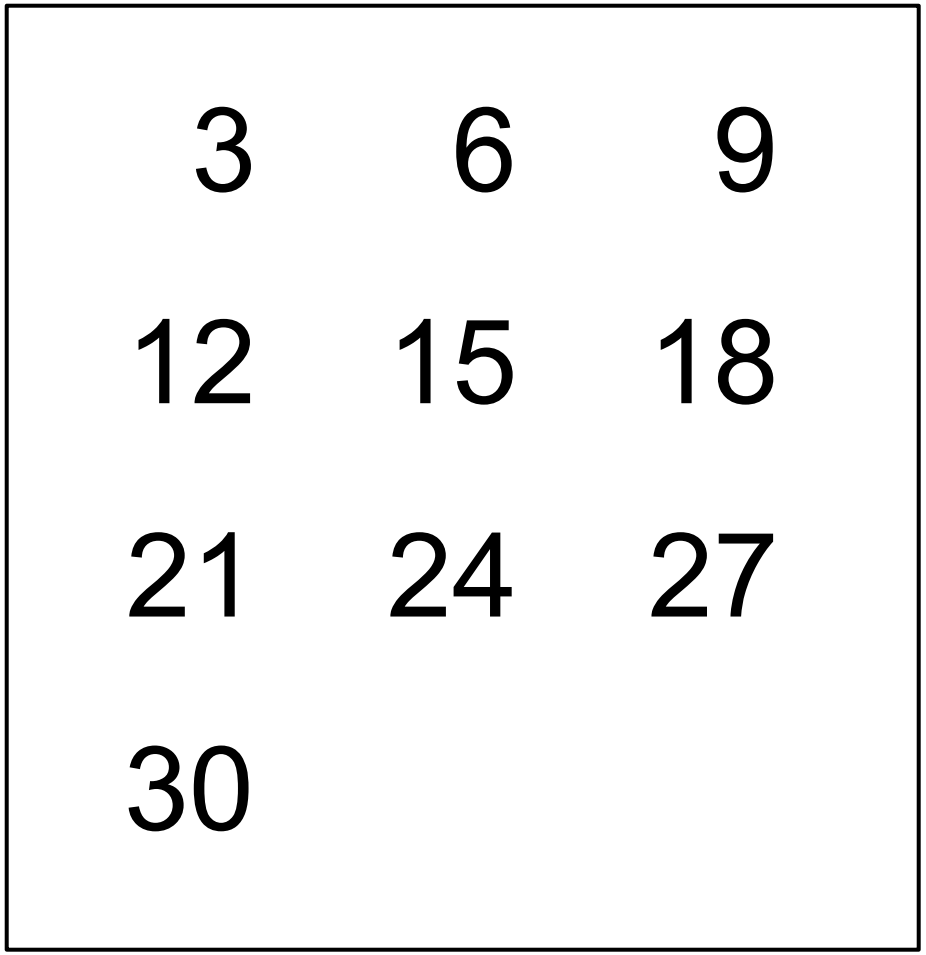
Guided Discovery

Better to have a DISCOVERY than a rule.



Two sides of a triangle must be greater than the third side.

Patterns in Multiples



Short Multiplication Chart

1									
2	4								
3	6	9							
4	8	12	16						
5	10	15	20	25					
6	12	18	24	30	36				
7	14	21	28	35	42	49			
8	16	24	32	40	48	56	64		
9	18	27	36	45	54	63	72	81	
10	20	30	40	50	60	70	80	90	100

Puzzle Numbers

Make an equation using

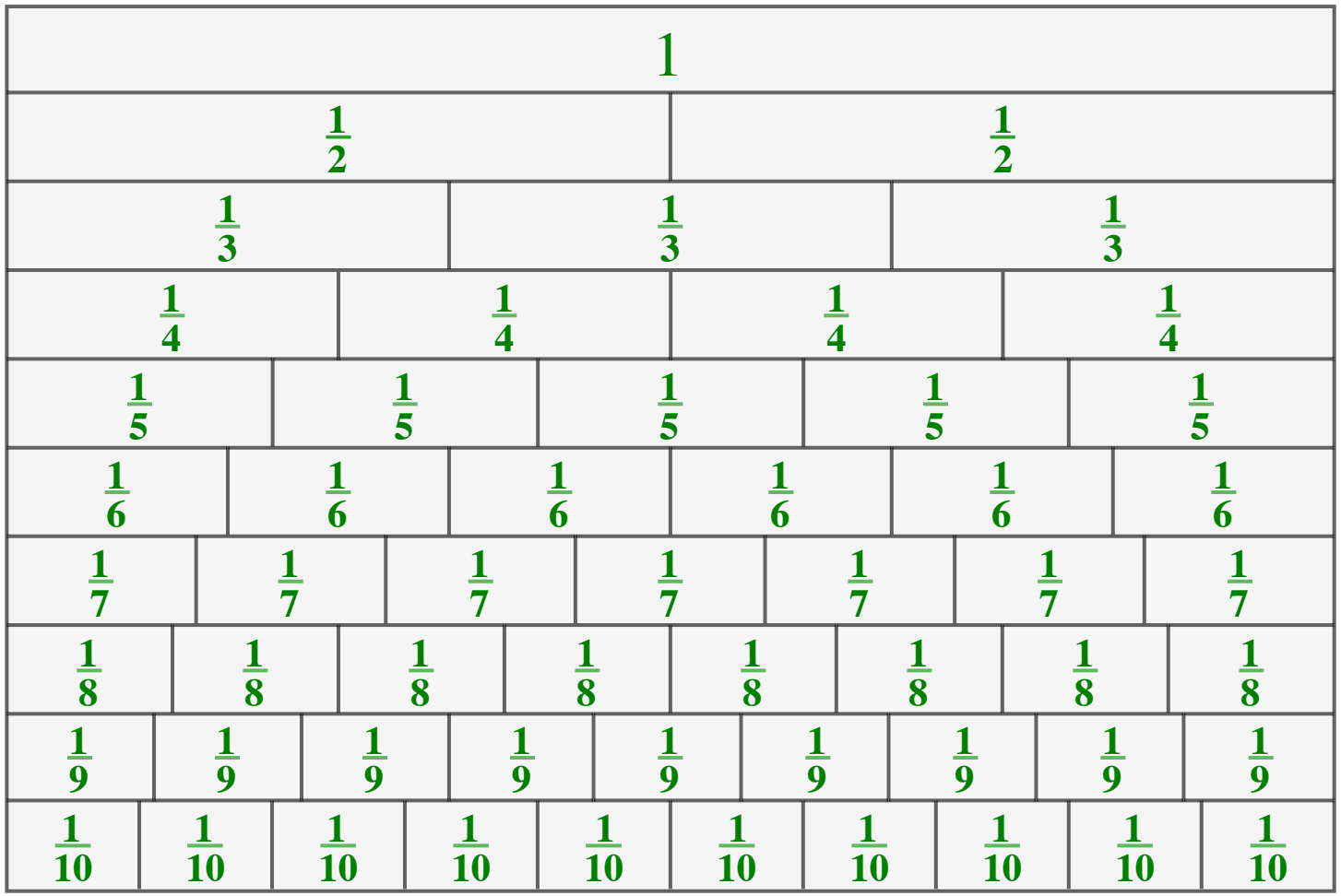
2 9 8 3

with mathematics symbols,

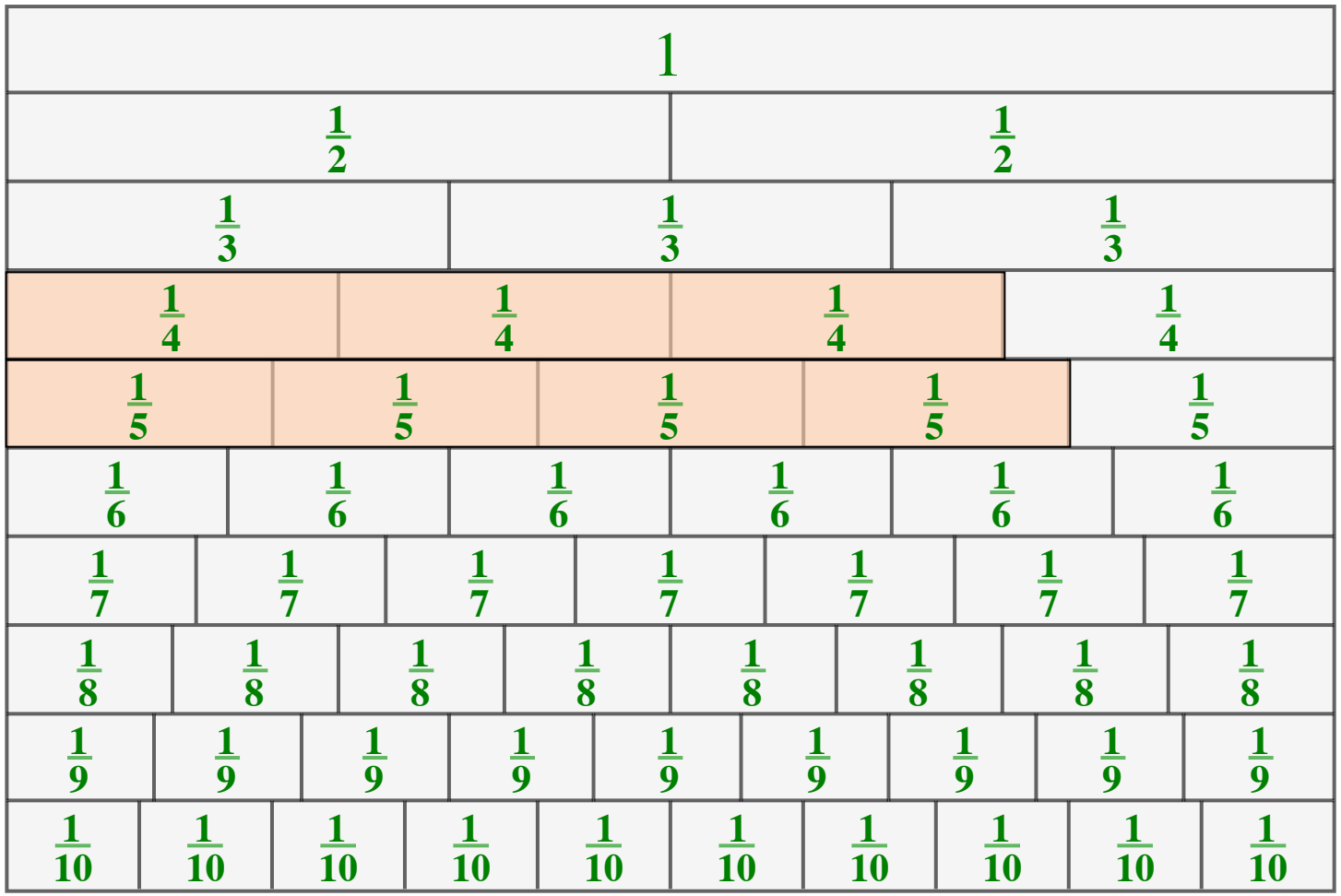
= + − × ÷ √ /

keeping the numbers in the same order.

Fractions

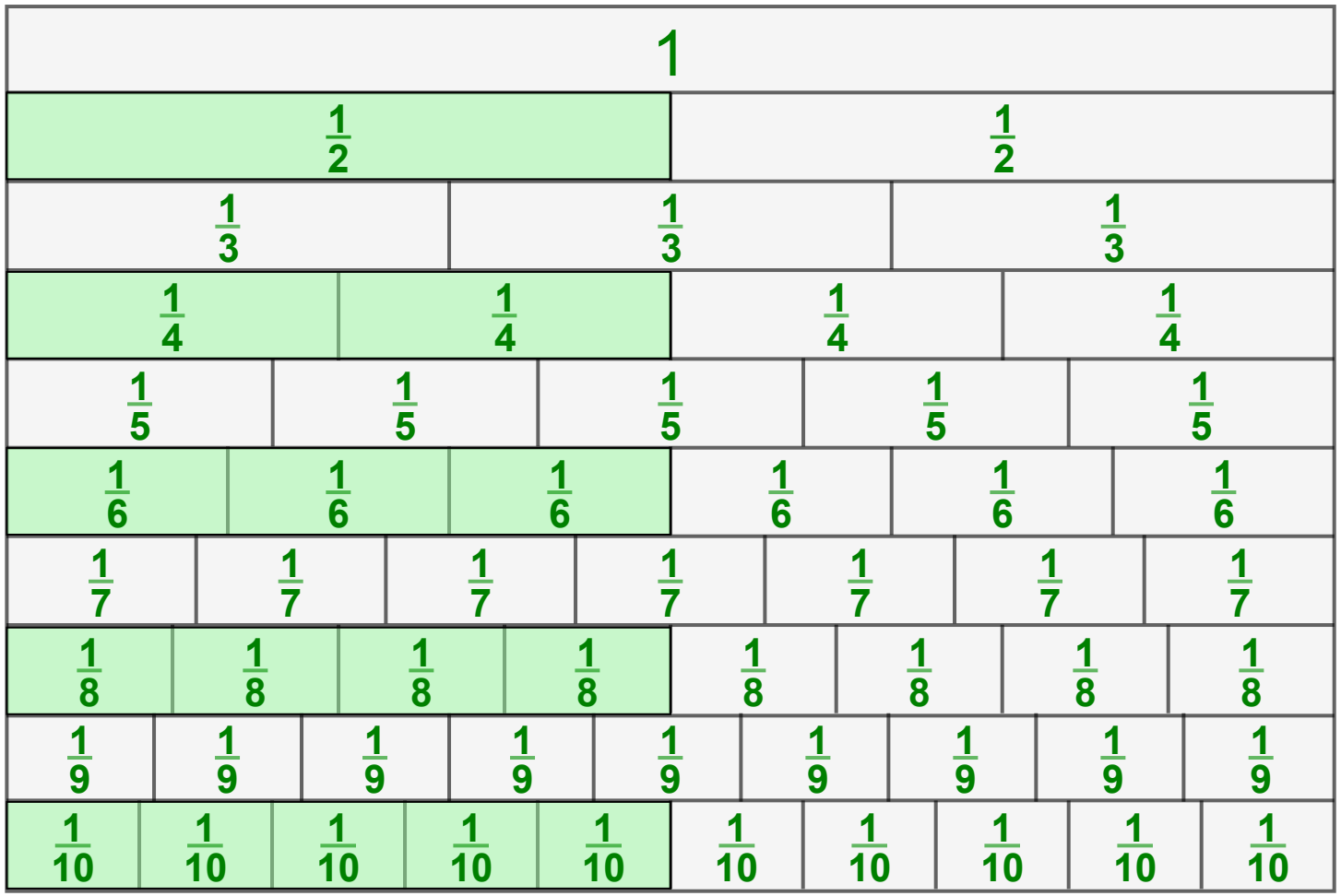


Fractions

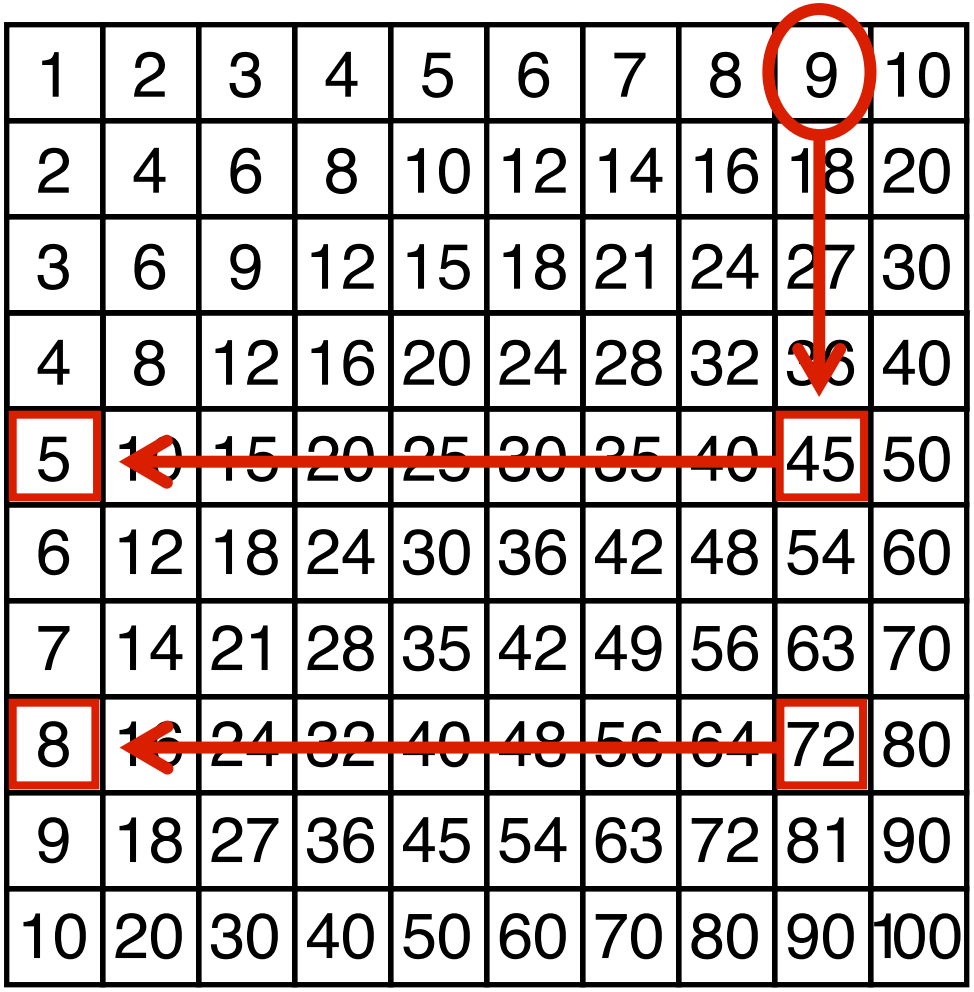


Which is more, 3/4 or 4/5?

Simplifying Fractions



Simplifying Fractions



1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

$$\frac{45}{72}$$

Why does this work?

Remember, let the child **discover** the algorithm.

In Conclusion …

Math needs to be taught so
95 percent is understood and
only 5 percent memorized.

Richard Skemp
– major pioneer in
mathematics education

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*