New Ways of Teaching and Learning Basic Arithmetic Using Visualizable Strategies

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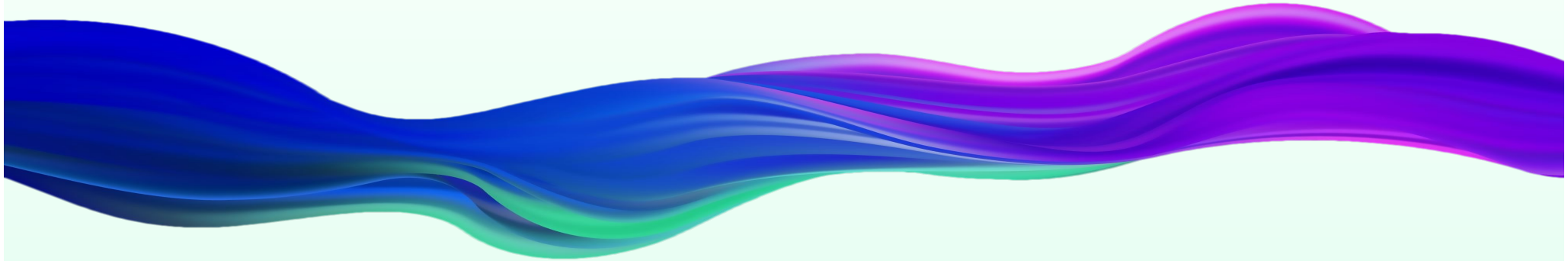

The Mathematics Education for the Future Project
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Number Sense

- Confusion often due to vague understanding of what numbers mean and how they relate to each other.
- Attempt to solve with rote memorization.

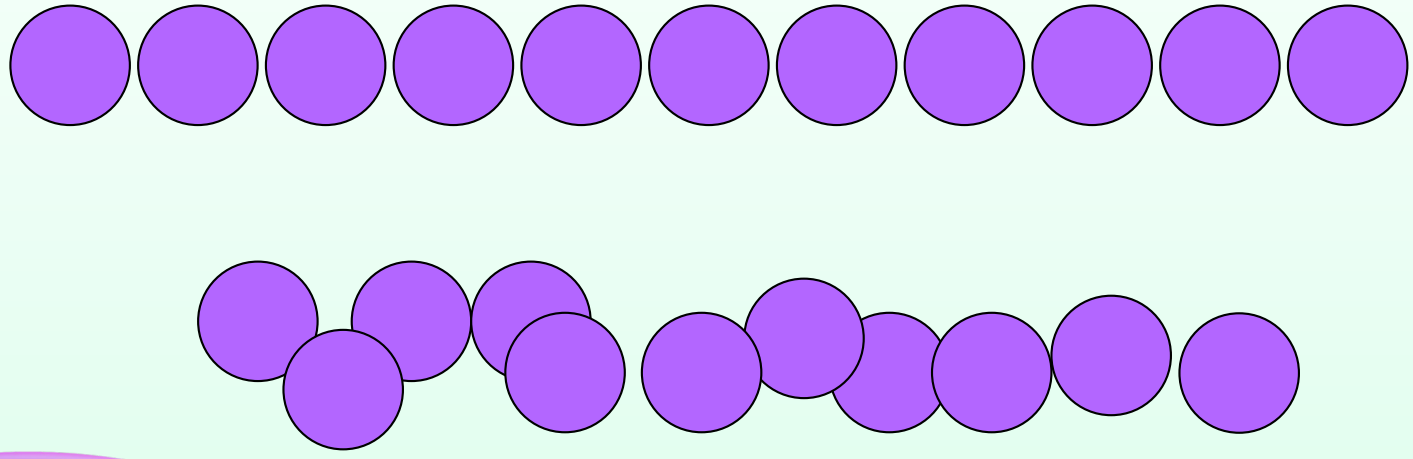
$$7 + 6 = 13$$

$$7 - 6 = 1$$

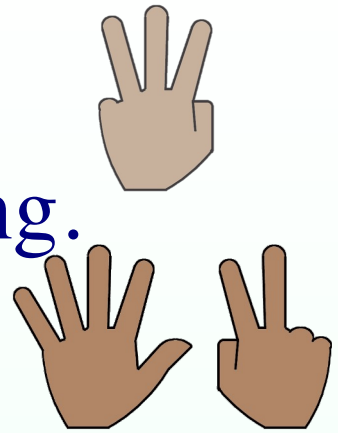
$$7 \times 6 = 42$$

Experience Counting Process

F	K
+ E	– D
K	G

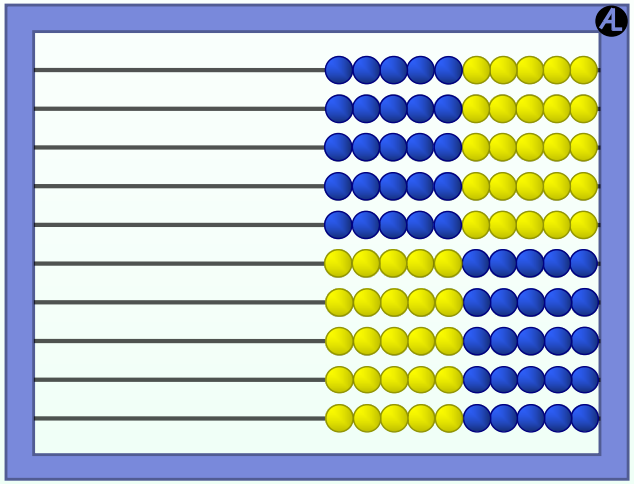


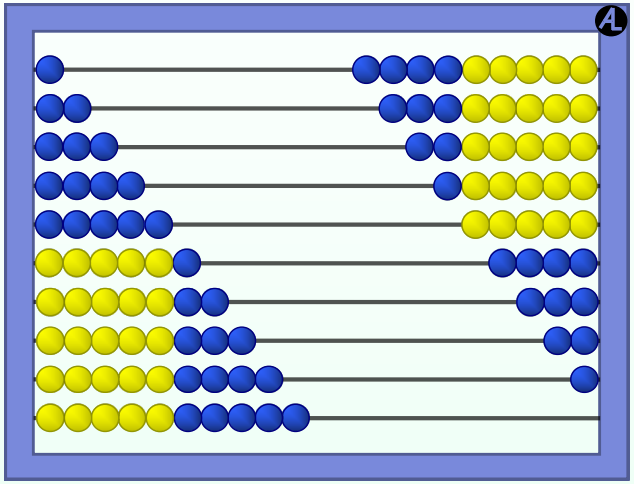
Subitizing, Visualizing, Strategies

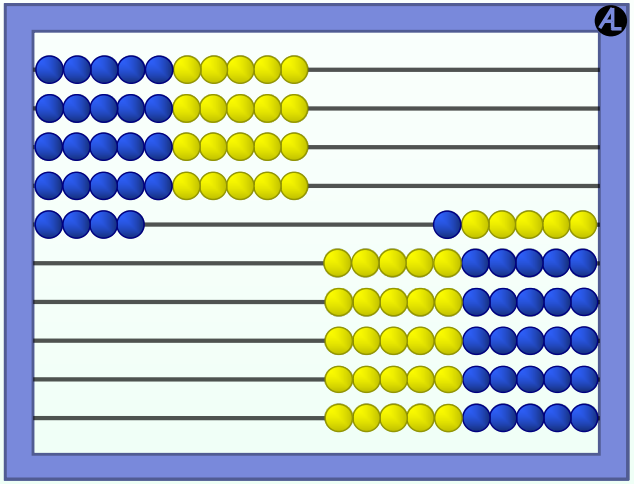


- **Subitizing** is the rapid and confident recognition of quantity without counting.
- Need grouping in 5s and 10s.
- **Visualizing** is the ability to form a mental image; to imagine; to see it in your mind.
- **Strategies** are a way to learn a new fact or to recall a forgotten fact; creates organization.
- **Visual representations = powerful strategies.**

Cotter Abacus

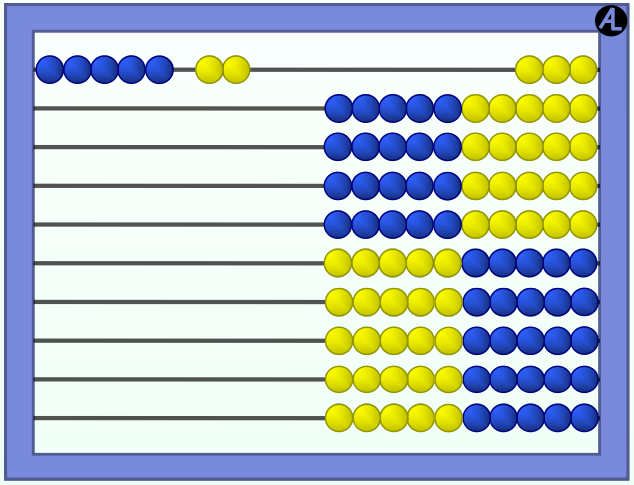




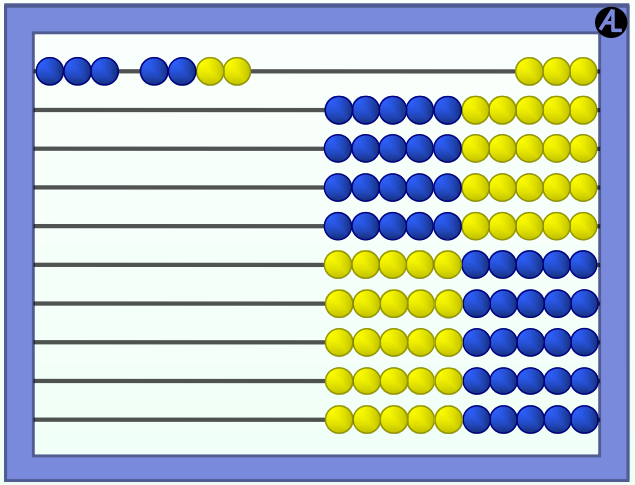


Addition

$5 + 2 = 7$

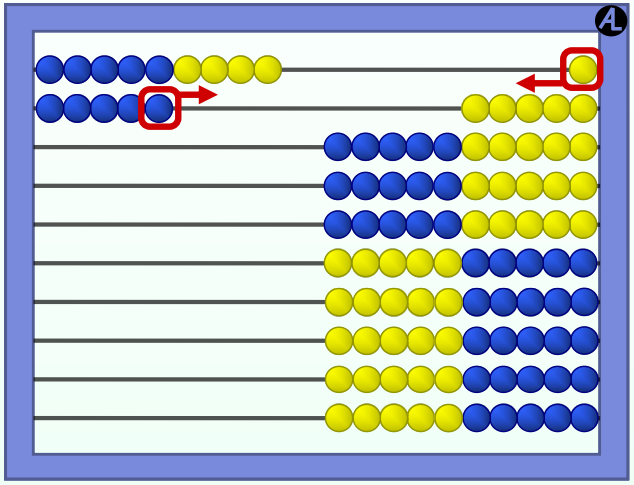


$3 + 4 = 7$

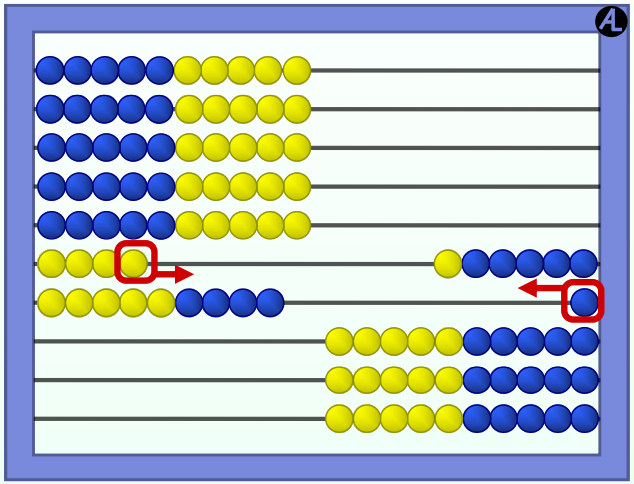


Addition Strategies

$9 + 5 = 14$



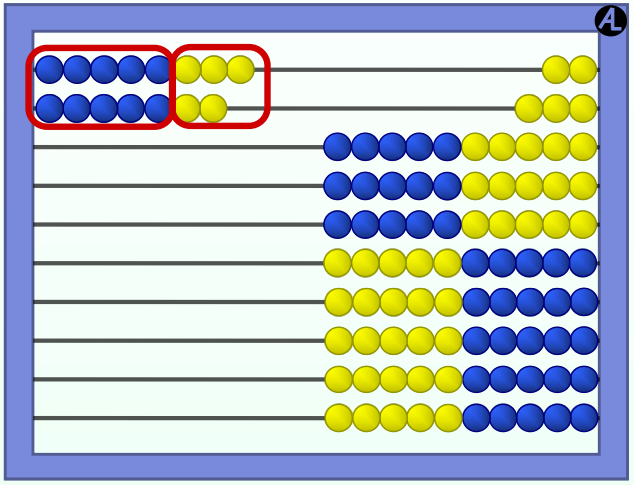
$54 + 9 = 63$



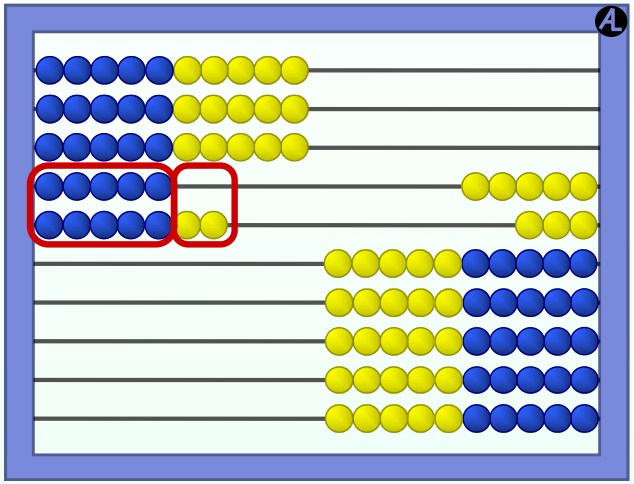
Complete the Ten Strategy

Addition Strategies

8 + 7 = 15



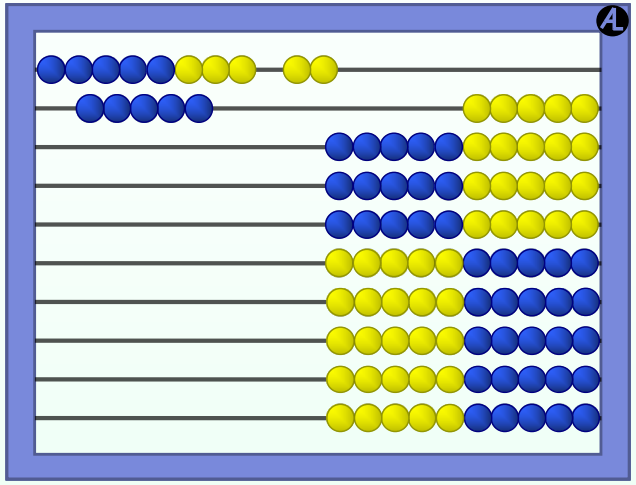
35 + 7 = 42



Two Fives Strategy

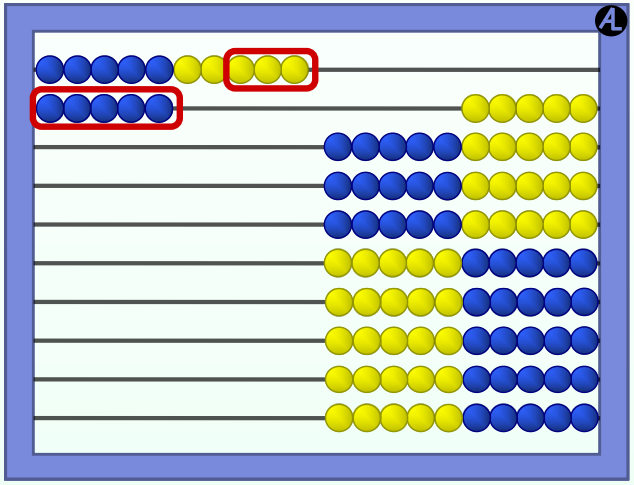
Subtraction Strategies

15 – 8 = 7



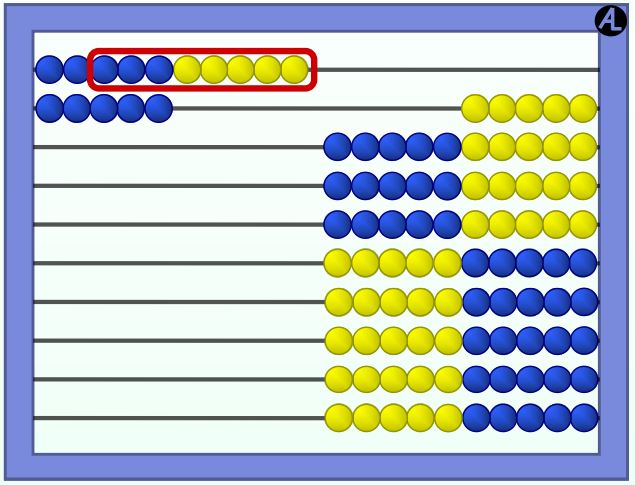
Going Up

15 – 8 = 7



Taking Part from Ten

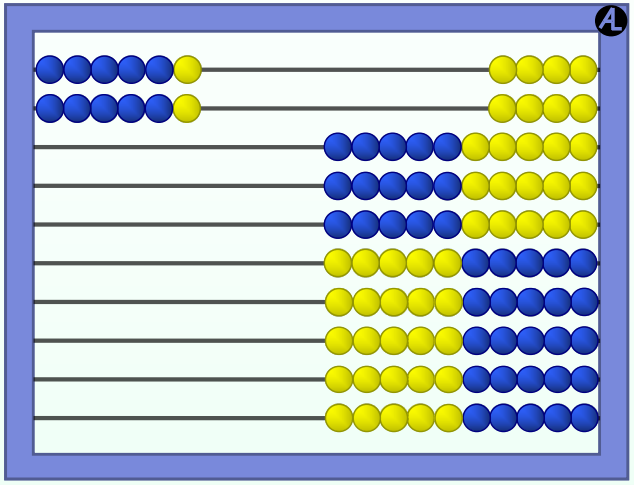
15 – 8 = 7



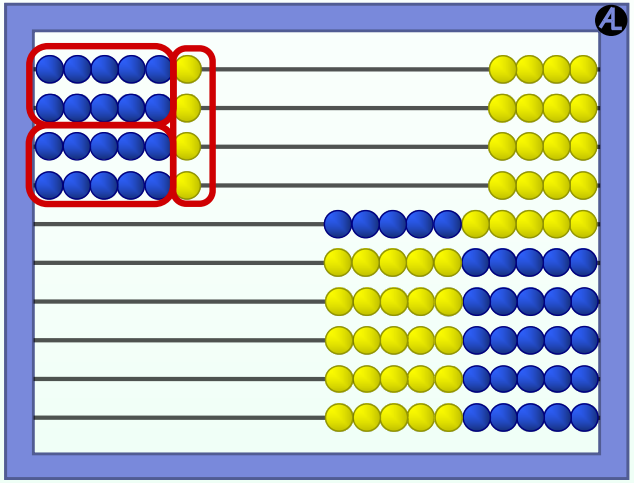
Taking All from Ten

Multiplication

$6 \times 2 = 12$

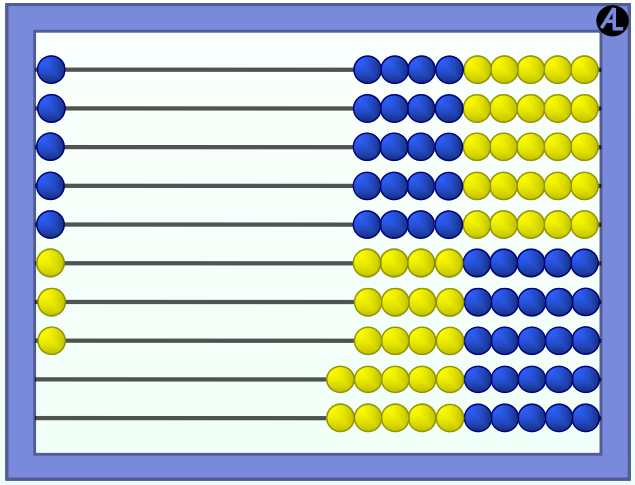


$6 \times 4 = 24$

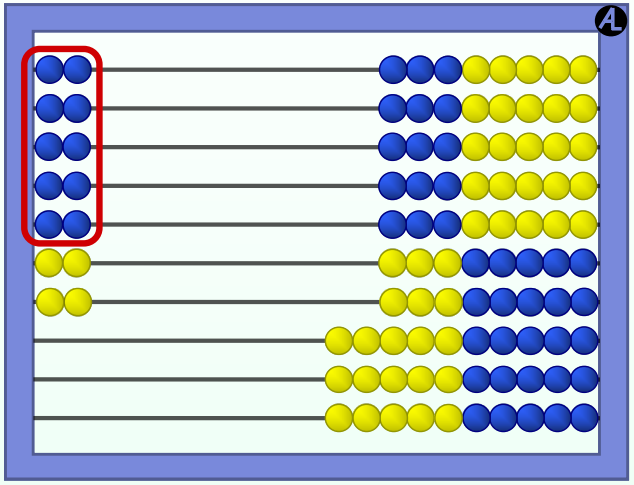


Multiplication

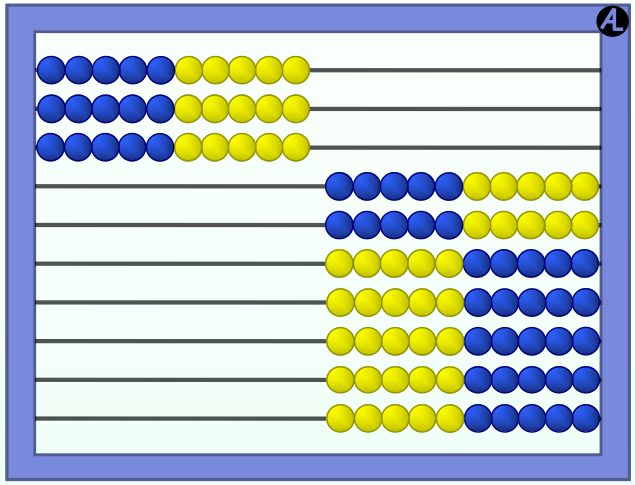
$1 \times 8 = 8$



$2 \times 7 = 14$

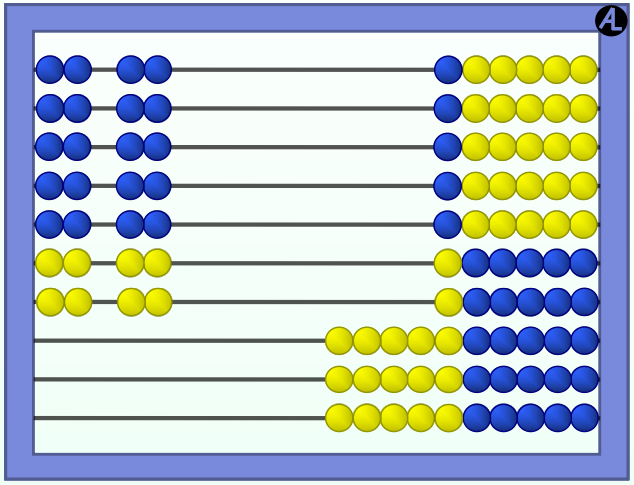


$10 \times 3 = 30$

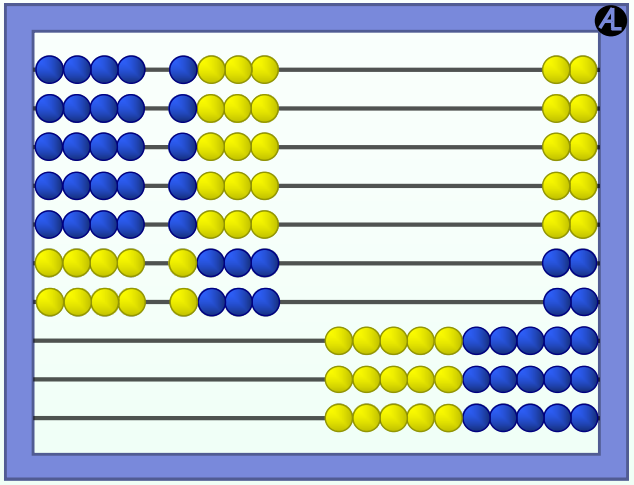


Multiplication Strategies

$4 \times 7 = 2 \times 7$ doubled

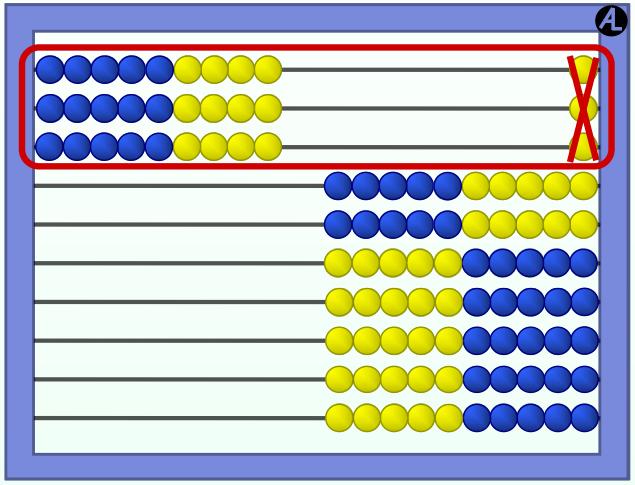


$8 \times 7 = 4 \times 7$ doubled

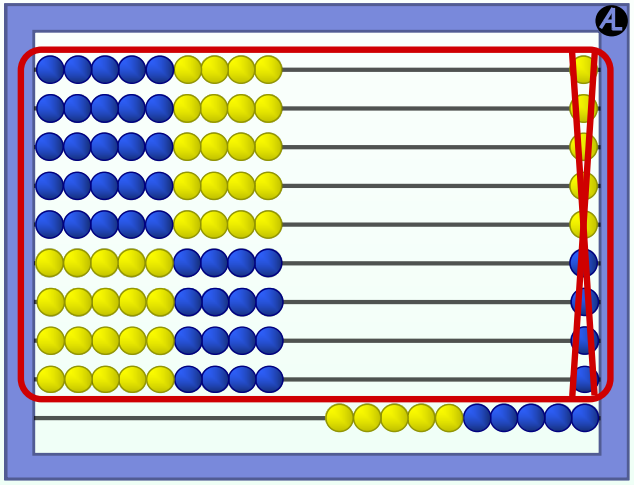


Multiplication Strategies

$9 \times 3 = 30 - 3$



$9 \times 9 = 90 - 9$



Summary

- 5s and 10s are the foundation for **subitizing**.
- Subitizing is the foundation for **visual representations**.
- Visual representations strengthen **strategies**.
- Visual representations and strategies gives answers in a format that can be easily recalled.
- **We need to teach the basic arithmetic facts so that children develop a reliance on subitizing, strategies, and visualization.**

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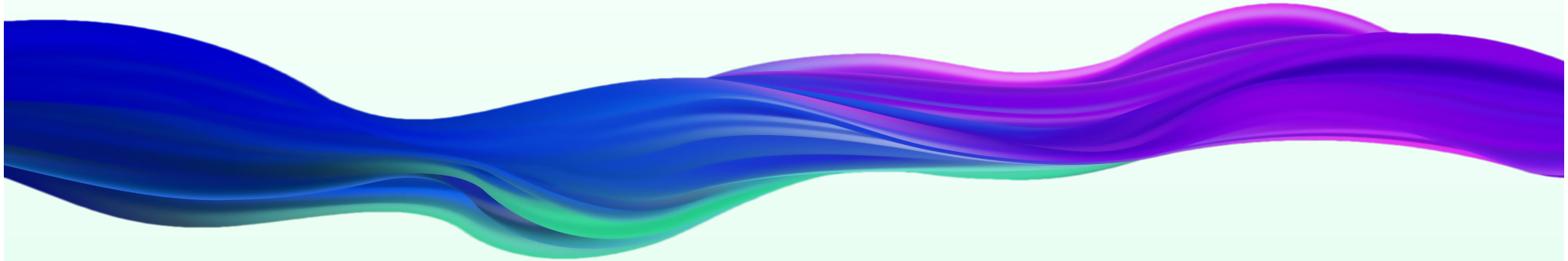

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