



# Multisensory Mathematics – Identifying your child's strengths and weaknesses

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# Mathematics

- Math is a multisensory process
- Computation and Conceptualization are fundamental and distinct skills
- Addition and multiplication are different
- Fluency is more important than Automaticity
- “Simple” concepts have layers of scaffolding
  - Your child will help you discover them!

# Multisensory Mathematics

symbolic
verbal
visual
concrete

math on paper

talking through process

imagining manipulative

manipulative

# Concept and Computation

- Understanding  $\neq$  Remembering
  - You can understand that addition is combining sets and not remember the addition facts
- Remembering  $\neq$  Understanding
  - You can know the multiplication facts but not know how to apply them

# Addition and Multiplication

- ▶ Both supported by a broad and similar neural system
- ▶ Addition – relies more on visual-spatial processing
- ▶ Multiplication – relies more on verbal processing
  
- ▶ *Dissociated brain organization for single-digit addition and multiplication.* (Zhou 2006)

# Fluency

- conceptual understanding
- accurate recall
- varied strategies
- multiple representations of facts
  - $3 \times 4 = ?$
  - $3 \times ? = 12$
  - $12 = ? \times ?$
- fast enough to maintain working memory

# Why Fluency?

- Values problem solving and memorization equally
- Frames learning as potential growth instead of a single destination
- Students who struggle with memorization discover other strengths
- Students who memorize easily discover other areas to develop

# Doubles and Doubles Plus One

- Great strategy
- Seems like a simple idea
- May require scaffolding

$$4+4=8$$

Doubles

$$4+5=9$$

Doubles + 1

# Doubles Plus One

- Doubles - two of the same number added together
- Doubles + 1 = neighbors on the number line
  - doesn't matter which one comes first
  - $4+5$ ,  $7+6$  are doubles + 1

# Thought Process

$4+5=$

- Are they doubles?
- Are they neighbors?
- Which number is smaller?
- Double that number
- Add one
- What is  $4+5$ ?

# Word Problems

- Reading Comprehension
  - Draw a picture
- Computation Errors
  - Sets up problem correctly
  - Computes incorrectly