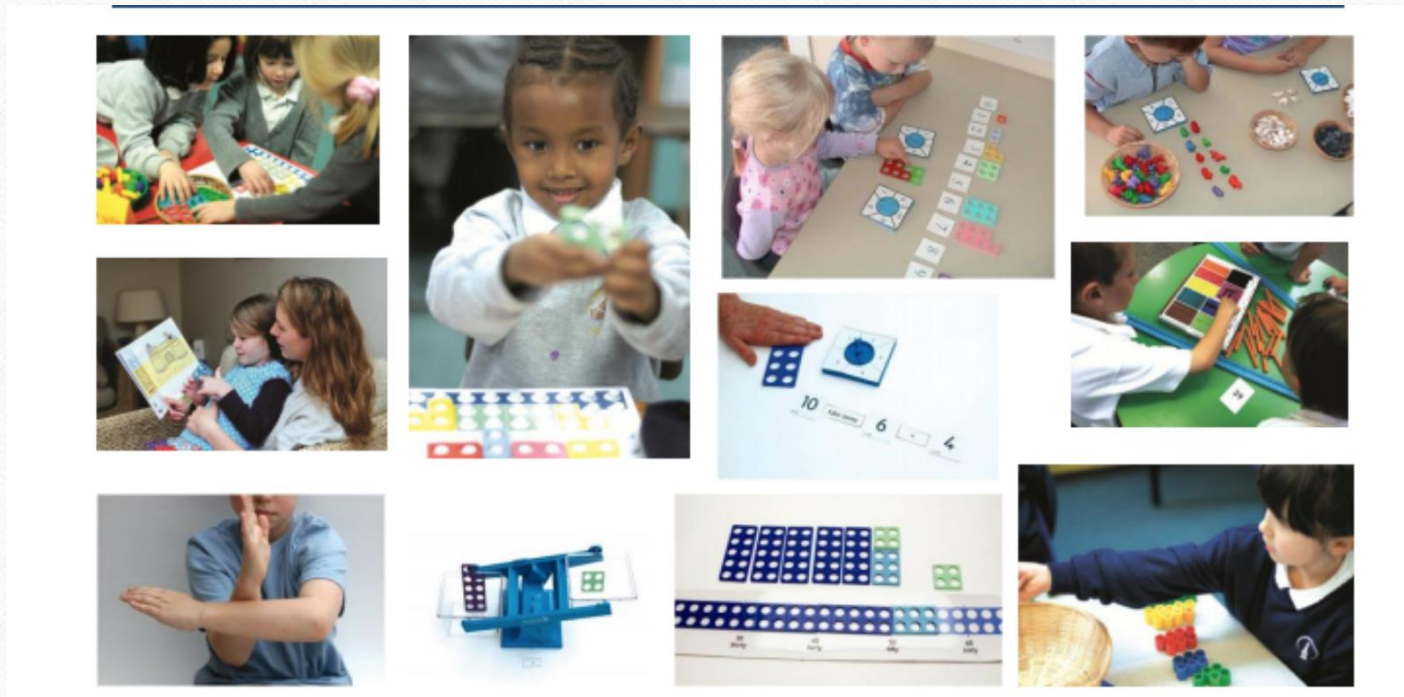


# Numicon:

transforming the way students understand mathematics



# Workshop Objectives:

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- Learn more about Numicon theory and the evidence behind it.
- Understand why Numicon is an effective approach for a student with Down syndrome.
- Learn practical mathematic applications through hands-on instruction and exploration of various Numicon materials.
- Discuss methods of instruction that will help keep our learners motivated, engaged, and included.
- Discover ways to create a number-rich learning environment at school and at home.



Math can be very abstract... especially for a learner with Down syndrome.

100 Most Common Chinese Characters

de	yī	shì	bù	le	zài
的	一	是	不	了	在
rén	yǒu	wǒ	tā	zhè	gè
人	有	我	他	这	个
mén	zhōng	lái	shàng	dà	wéi
们	中	来	上	大	为
hé	guó	dì	dào	yǐ	shuō
和	国	地	到	以	说

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

# A "Sea" of Ones

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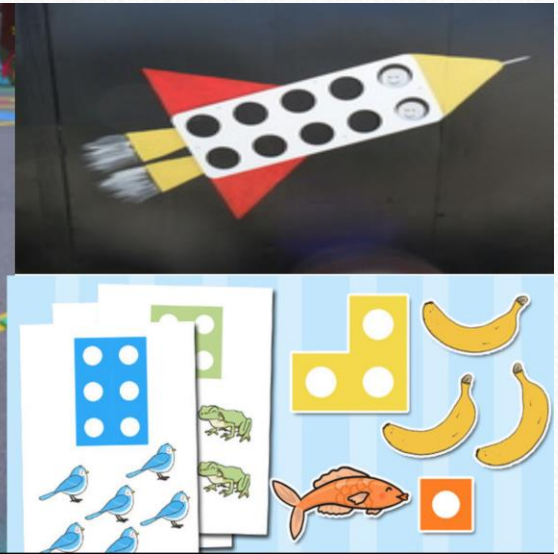
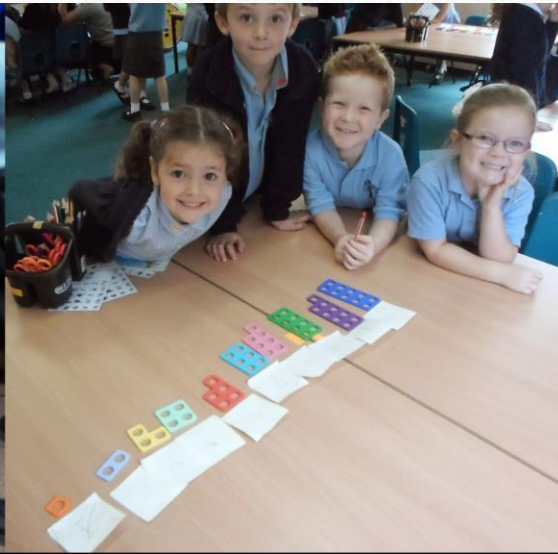
# What is Numicon?

- Multi-sensory approach using patterned shapes, manipulatives, number lines, everyday objects, experiences, and contexts
- Makes calculations "real" by allowing students to physically "do" what we want them to "think"
- Appeals to students with strong visual thinking and memory skills





# Making Math Real



# Numicon: Origin & Theory

- Developed in UK by teachers through classroom-based research
- Fosters self-belief to help students persist through the difficulties of math
- Action + Imagery + Conversation
- Multi-sensory approach plays to strengths and releases potential for learners to enjoy, understand, and achieve





# Numicon and children with Down syndrome

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In a Wiltshire project of 2001, the Numicon approach was used to support specifically children with Down syndrome, and the reporting educational psychologists found,

"... results to be extremely pleasing in view of the fact that children with Ds do not normally make one month's progress per month, yet the average gain exceeds this, and many individuals have improved their skills at a much faster rate than the average."

(Ewan and Muir, 2002)

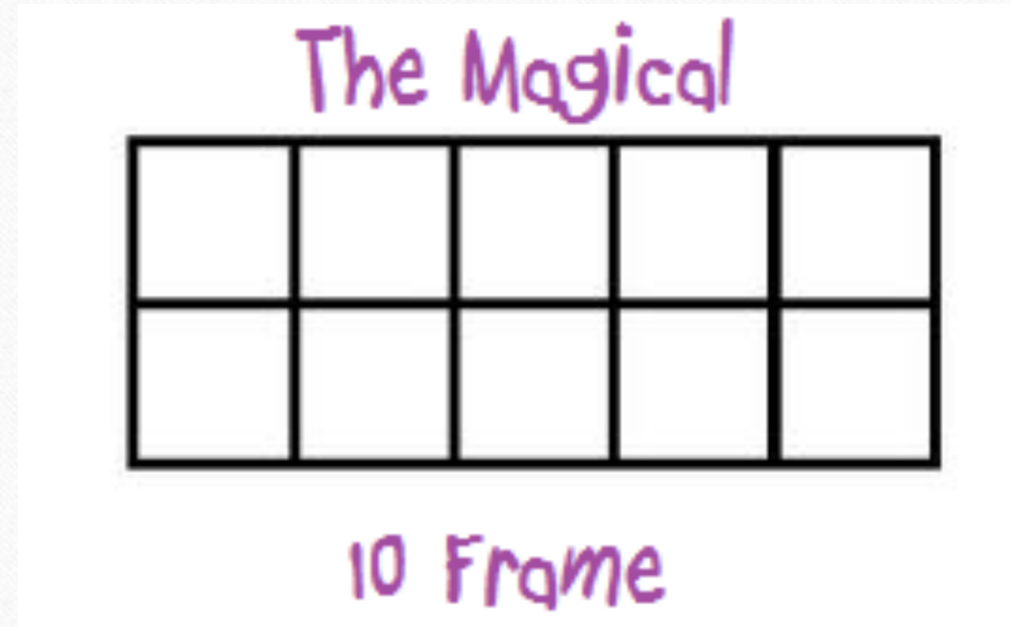
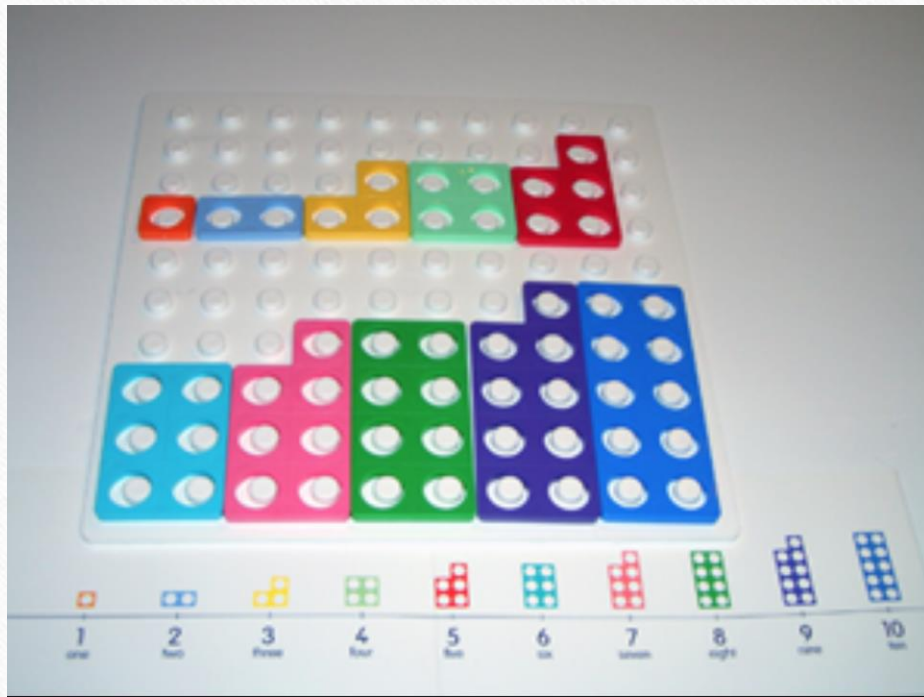


# More Evidence...

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- Down Syndrome Education International - Working with Numicon since 2000.
- Research project undertaken with 16 children with Ds in the UK showed that all children following Numicon approach made better progress than other children with Ds not using the system.
- Concluded that "Numicon enables teaching staff to "see" what the child is thinking, which is important for identifying successes and confusions in the child's understanding" and "Children are motivated to engage with the materials as they are so attractive and they develop confidence in math work as they can succeed with the materials."

# How does it work?





# Numicon Materials:

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- Number shapes
- Number line
- Feely bag
- Pegs/Rods
- Laces
- Spinner w/ overlay
- White board (100 board)
- White board overlay
- "Teaching Number Skills to Children with Ds Using Numicon" publication
- 101 Things to do with Numicon

# Establishing a solid foundation:

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- It is important that every child meeting Numicon for the first time learns the foundation activities, regardless of ability level.
- Small steps!
- Eight broad stages – no timeline
- Games, not WORK!
- Advanced kits for advanced concepts



# Stage 1: Introducing Shapes & Patterns

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## Getting Started:

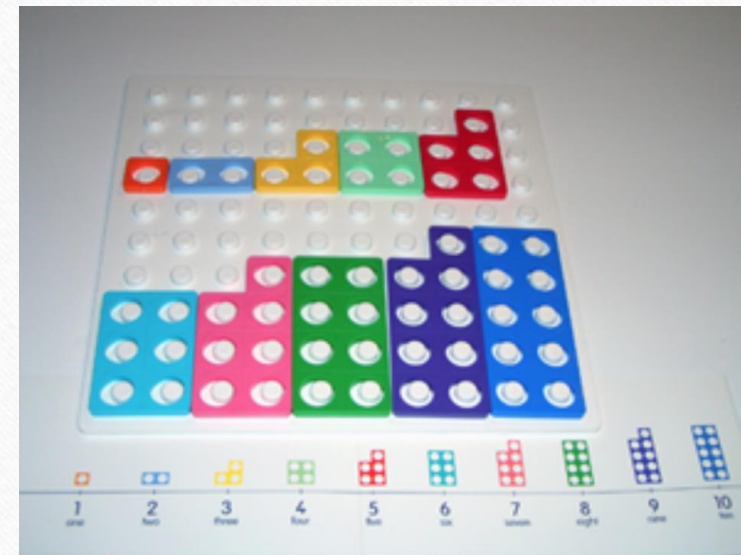
- Recommend starting as early as 18 months, but there is no age limit!
- Students explore patterns and shapes without naming numbers or numerals – just having fun
- Reinforce with visual number line



## Stage 2: Putting Shapes in Order

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- Start small and work up
- Reinforced with number line
- Work on ordering with a variety of objects, large and small – this is an important concept to grasp





# Stage 3: Assign Number Names to Shapes

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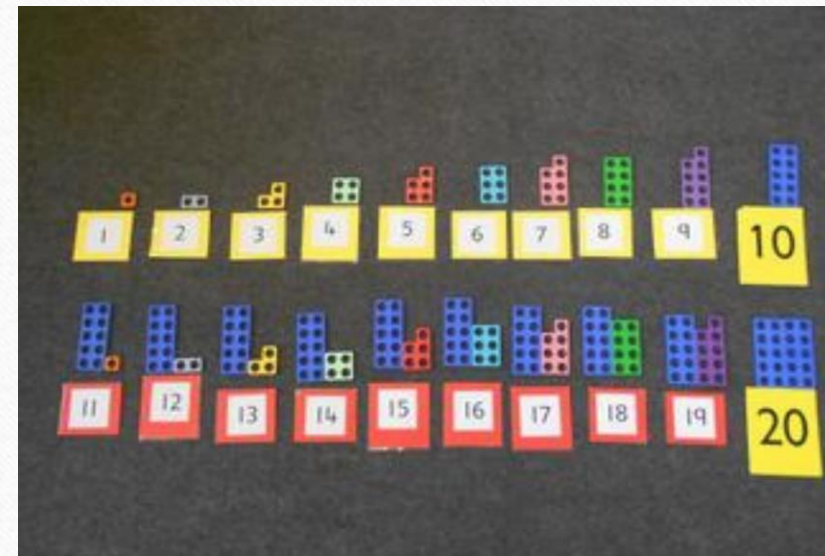
- Reinforce by counting holes and filling with pegs to reinforce number recognition



# Stage 4: Ordering Shapes & Numbers Together

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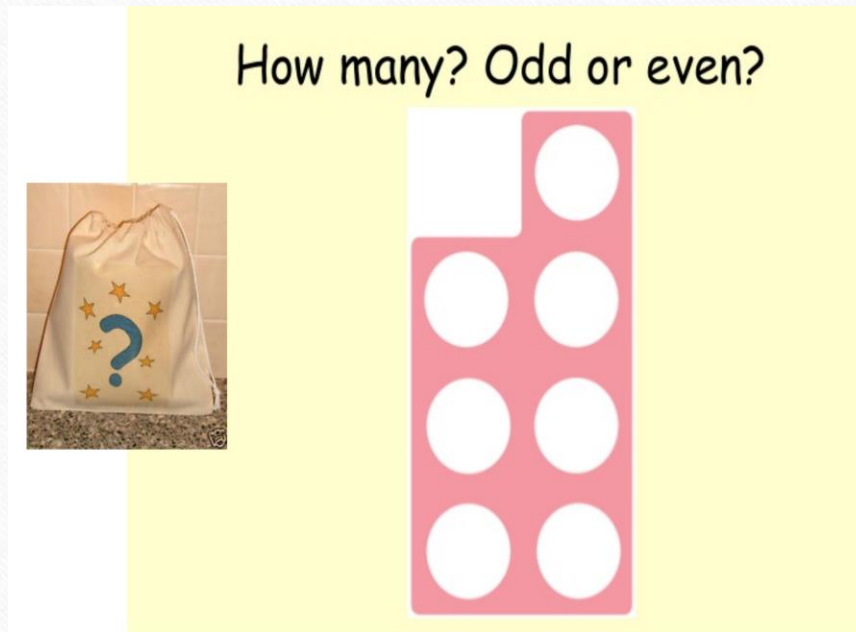
- BIG Step!
- Takes time to master
- Connecting counting AND ordering skills





# Stage 5: Consolidation of Skills

- Learner confidently recognizes Numicon shapes, number names, numerals, and makes connections between varied counting experiences and Numicon shapes
- Visualizing shapes in "mind's eye" to prepare for the time they will cease to rely on actual Numicon shapes
- Will have a clear mental picture of the number they can use



# Stage 6: Relating Numicon to Early Math

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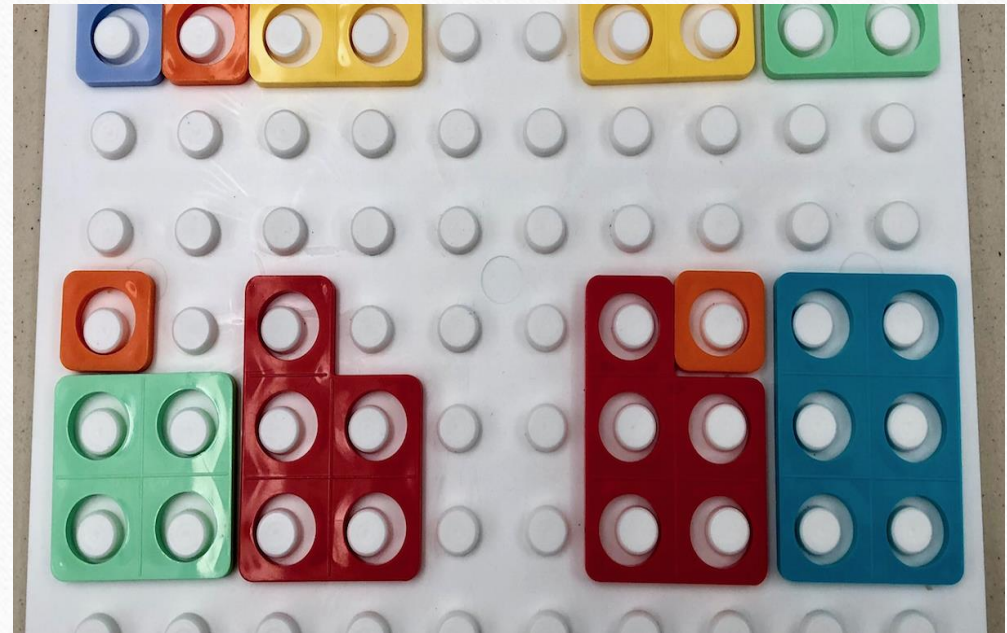
- Student now has a firm understanding about size, order, and relationship of numbers
- Can begin to relate addition to combining two or more Numicon shapes and learn vocabulary involved in adding





# Stage 7: Adding "One More"

- Encourages mental math
- Can see with shapes if you add one to any number, it's the same as the next number
- Doubles – Special combination of two numbers









# Stage 8: Subtraction

- Hiding replaces "taking away" when using Numicon shapes
- The tricky "comparison and difference" structure of subtraction is easily seen when comparing two shapes.
- Example: What's the difference between 8 and 3?
- Use manipulatives/pegs in holes to reinforce "taking away"

Name: \_\_\_\_\_ Date: \_\_\_\_\_

L.O. I can work out subtraction facts of 5

 $5 - 1 = \boxed{4}$	 $5 - 0 = \boxed{\phantom{0}}$
 $5 - 2 = \boxed{\phantom{0}}$	 $5 - 3 = \boxed{\phantom{0}}$
 $5 - 4 = \boxed{\phantom{0}}$	 $5 - 5 = \boxed{\phantom{0}}$



# Numicon: Advanced Concepts

Multiplication

Division

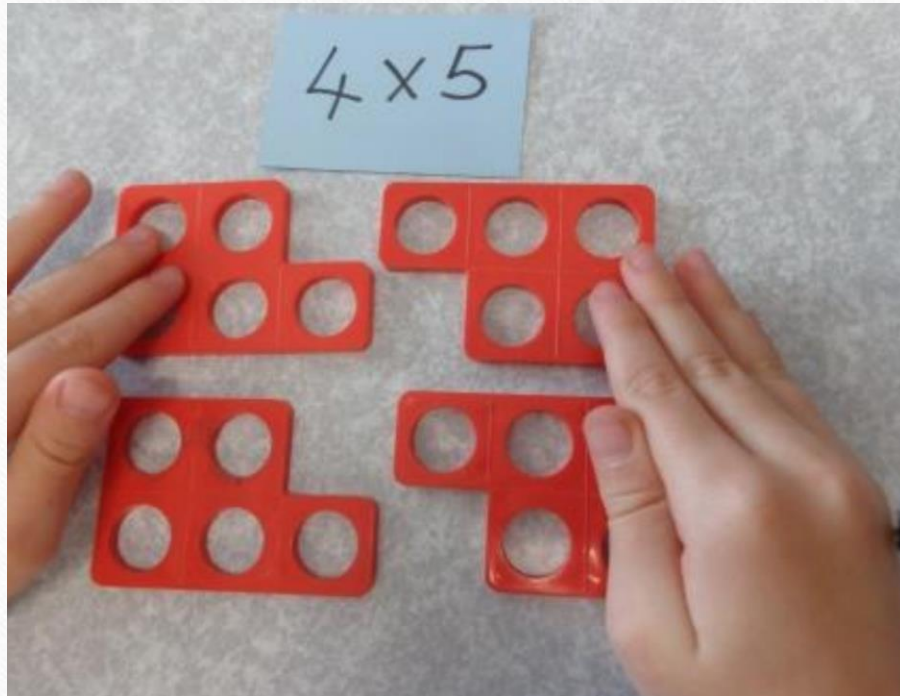
Decimals

Fractions

Money

Time

# Multiplication & Division

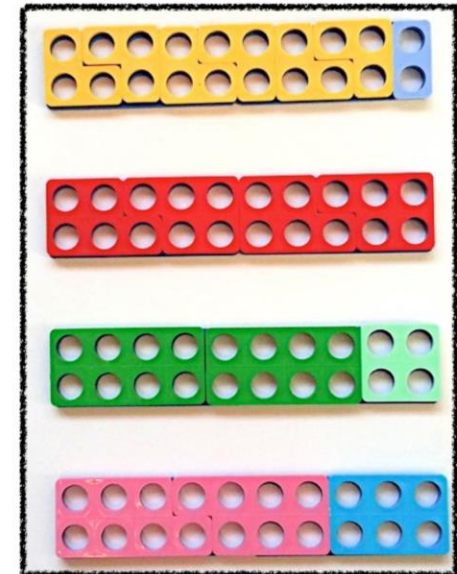


$$20 \div 3 = 6r2$$

$$20 \div 5 = 4$$

$$20 \div 8 = 2r4$$


$$20 \div 7 = 2r6$$






# Fractions & Decimals

$2 + \frac{1}{3} = \frac{3}{3} + \frac{1}{3} + \frac{1}{3} = \frac{7}{3}$



Gramazzle

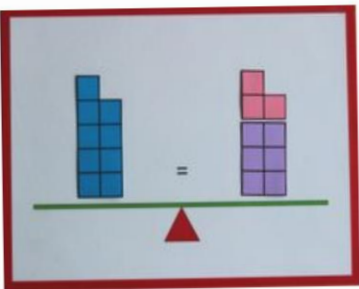
$3 + \frac{1}{4} = \frac{4}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{13}{4}$



# Counting Money & Telling Time







# Effective Instruction

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- UDL framework (IDEA, 2004)) gives students of all abilities access to learning through multiple means of instruction, expression, and engagement.
- Be creative and flexible. Find multiple ways to engage your learner by understanding what motivates that individual. Customize your approach based on that child's individual learning profile – there's no "one size fits all" approach.
- Consistency and repetition are KEY.
- Patience is a necessity.
- Numicon is an EXCELLENT tool to promote inclusion. This approach benefits ALL early learners!
- Make EVERY experience a learning experience.



# Numicon for Purchase

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- \$70-\$100 Walmart, Book Depository, Amazon
- Everything Numicon at Oxford University Press

