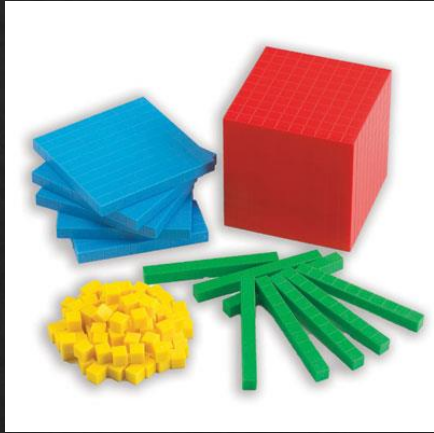


Alexander McLeod
maths manipulatives
CPD event
6th July 2021

Jill Trinder PGCE MA SFHEA



Why use manipulatives/representations?


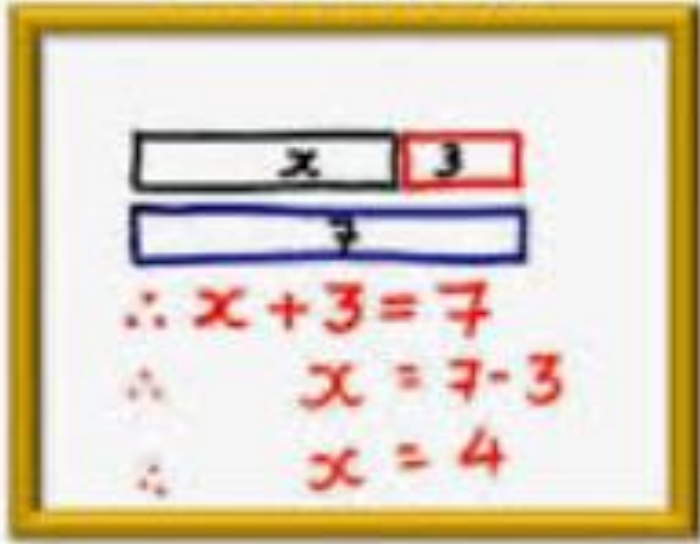
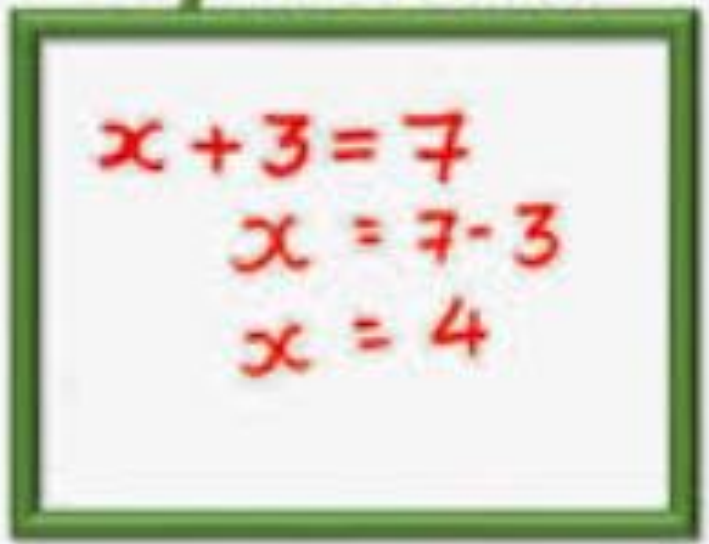
Who should have access to them?

How long should we use them for?



Author: Jill Trinder, University of Greenwich

Progression in Approaches

Enactive	Iconic	Symbolic
		

Concrete

Pictorial

Abstract

Improving Mathematics in the Early Years and Key Stage 1

Five recommendations to support practitioners in developing the maths skills of 3-7 year-olds



Published 24th January, 2020

↓ Scroll down to read more



[The Big Picture](#)

[Evidence summaries](#)

[Practical Tools](#)

[Projects and Evaluation](#)

[Support for schools](#)

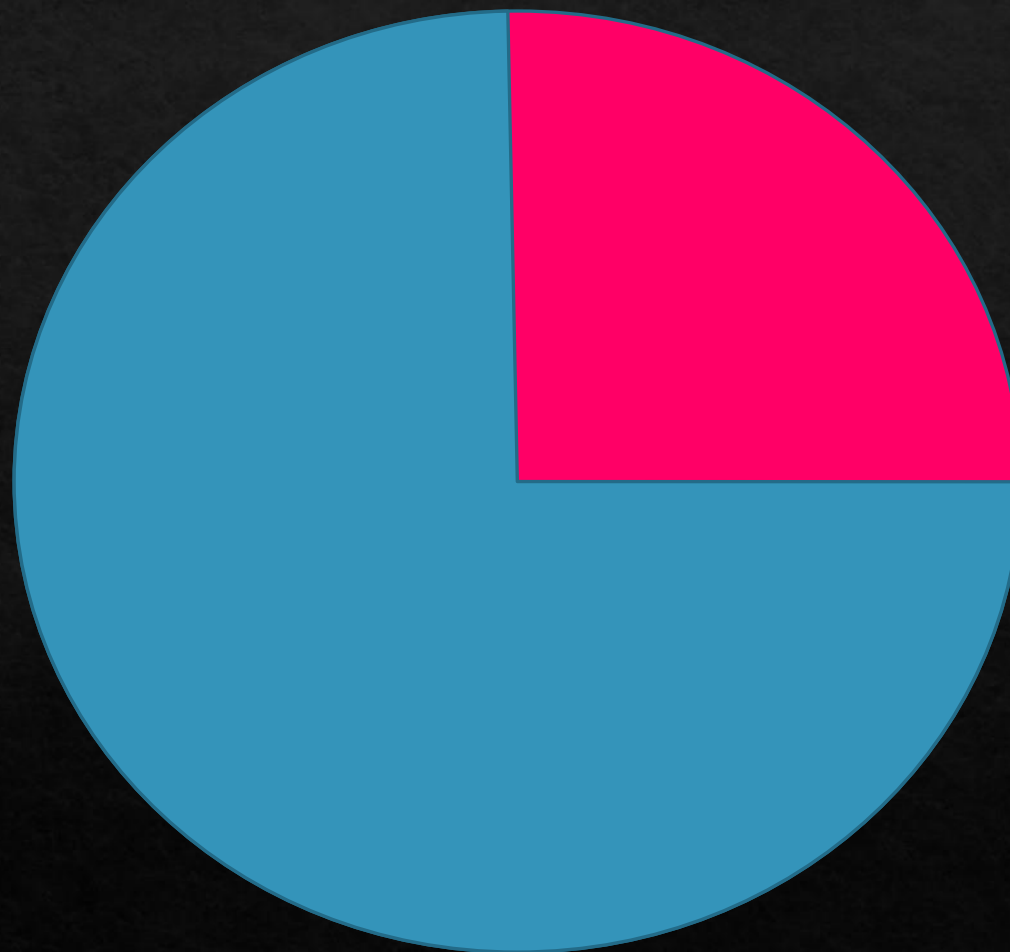
[School Improvement F](#)

Improving Mathematics in Key Stages 2 and 3

Eight recommendations to improve outcomes in maths for 7-14 year olds

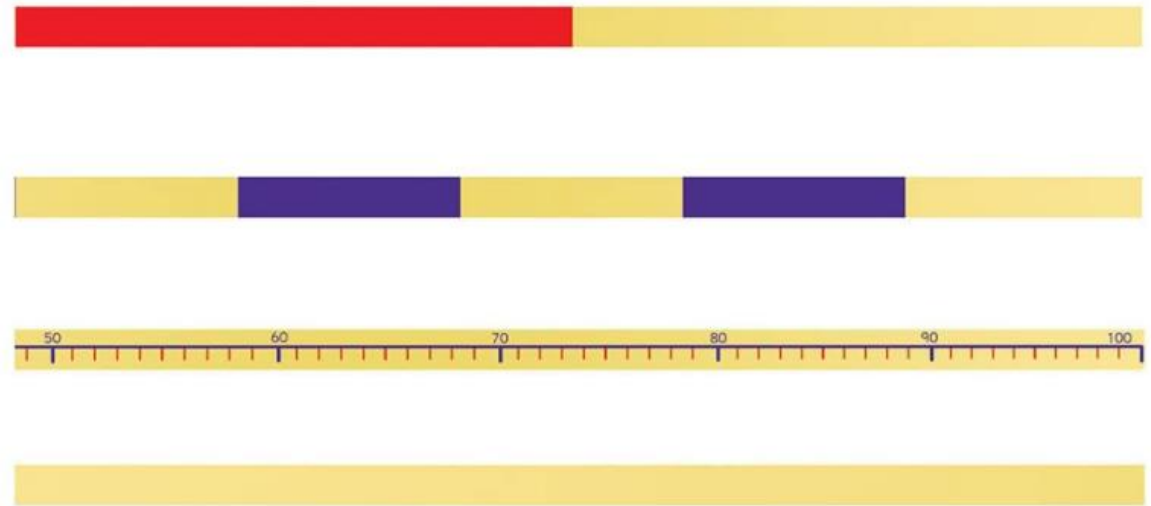
Author: Jill Trinder, University of Greenwich

The 'Pacman'



Author: Jill Trinder, University of Greenwich

Counting Sticks





The Pendulum

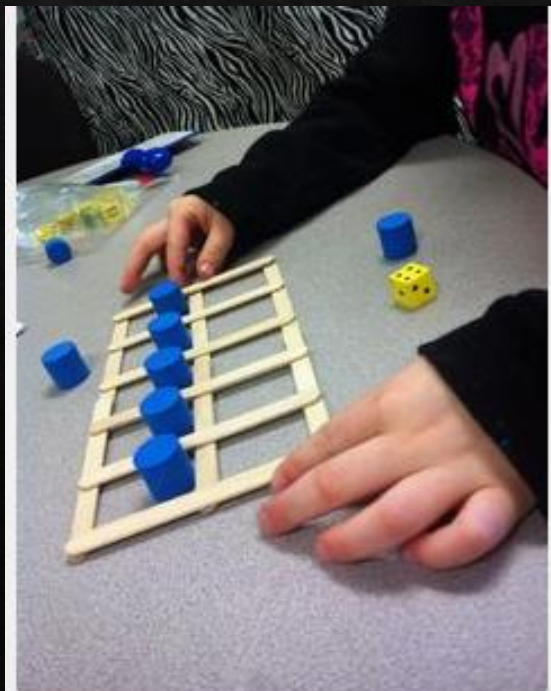
You definitely won't be 'feeling sleepy'!

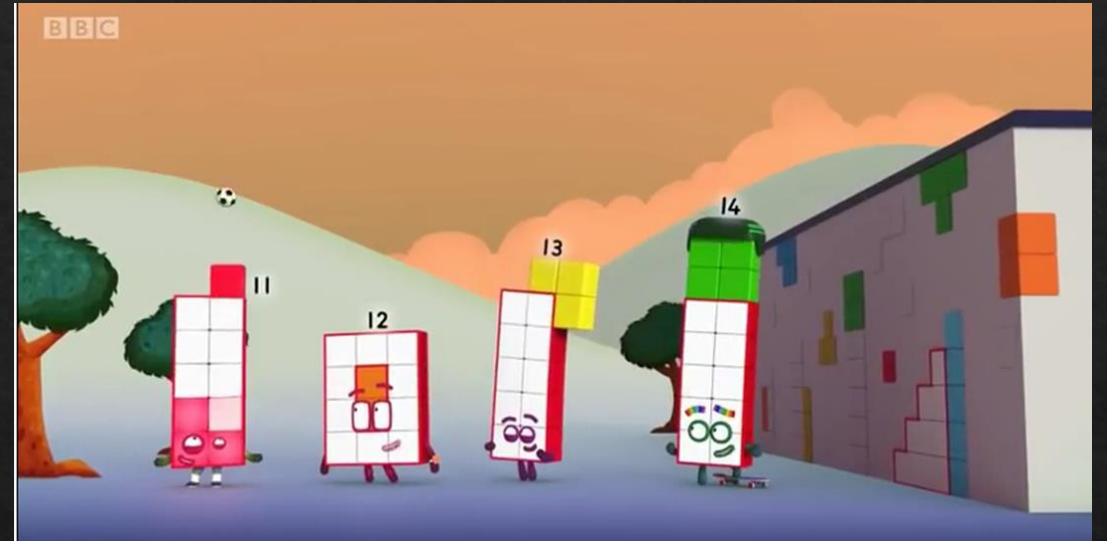
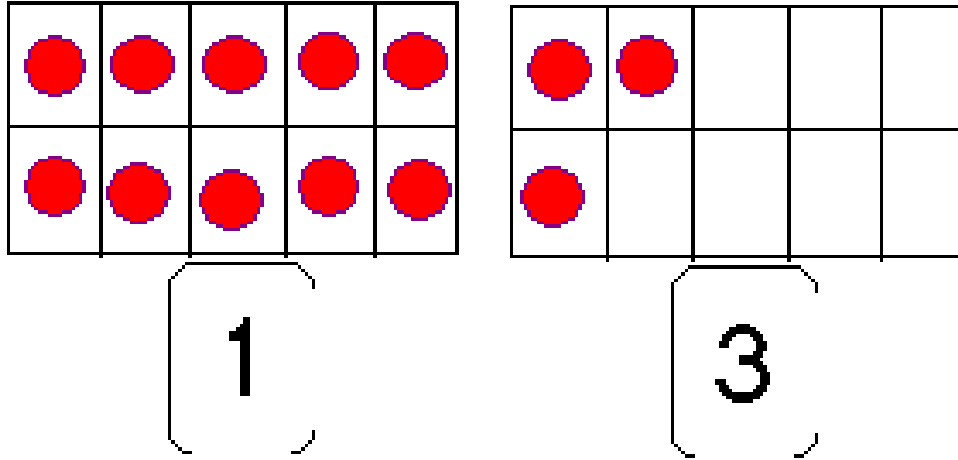
Author: Jill Trinder, University of Greenwich

Fives & Tens Frames in the Early Years



Author: Jill Trinder, University of Greenwich

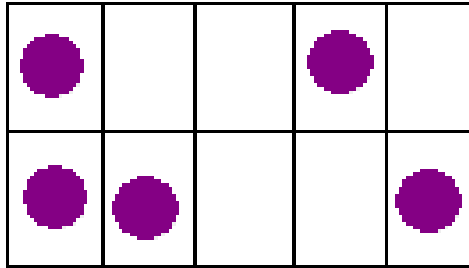




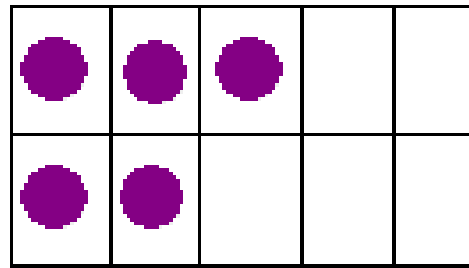
Tens Frames for Place Value

Tens Frames

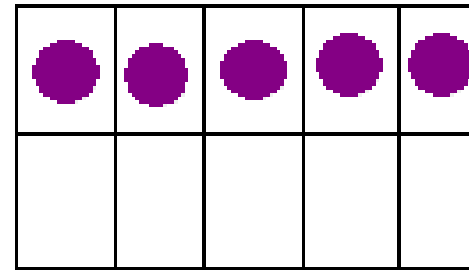
Frame A



Frame B



Frame C



Way, J. (2011) 'Number Sense Series: A Sense of 'ten' and Place Value' available at: <https://nrich.maths.org/2479>

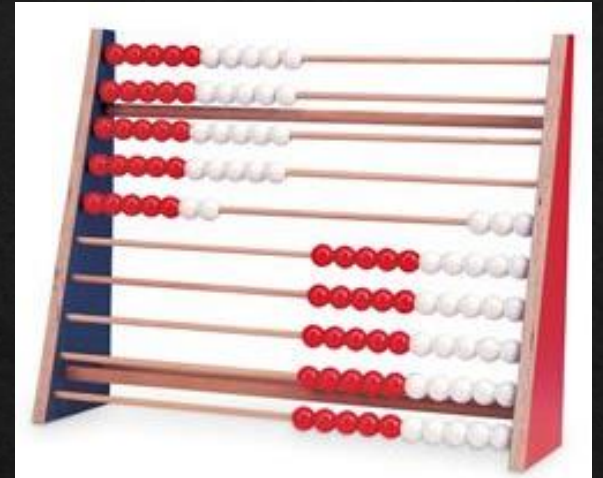


Author: Jill Trinder, University of Greenwich
Number Talks-1st Grade
Janis Garner-Stanislaus County Office of Education

Rekenreks

MathsBot.com

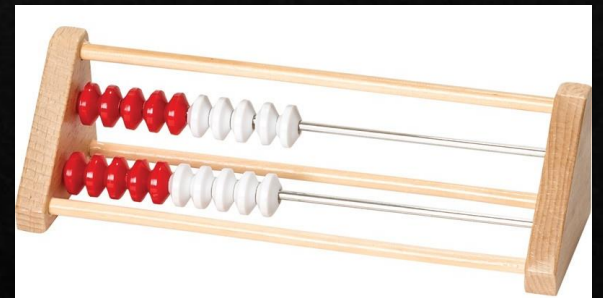
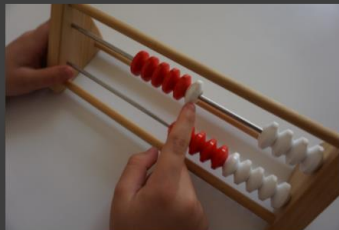
Tools for Maths Teachers



NEWS

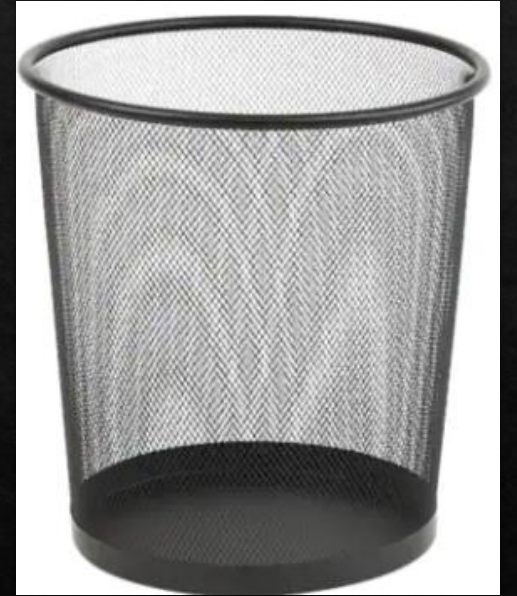
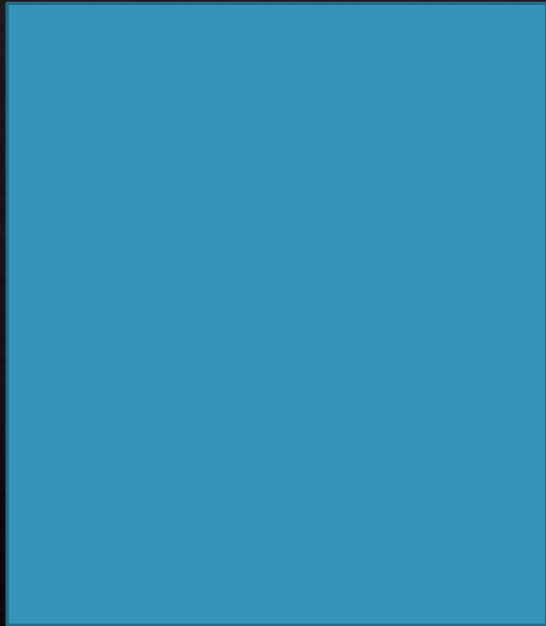
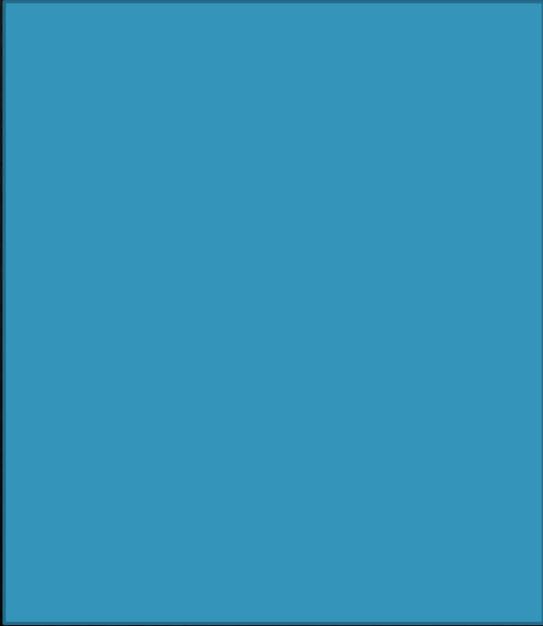
MASTERING NUMBER: A NEW PROGRAMME FOR EARLY PRIMARY PUPILS

A nationwide project for 2021/22 aimed at teachers and pupils in
Reception, Year 1 and Year 2



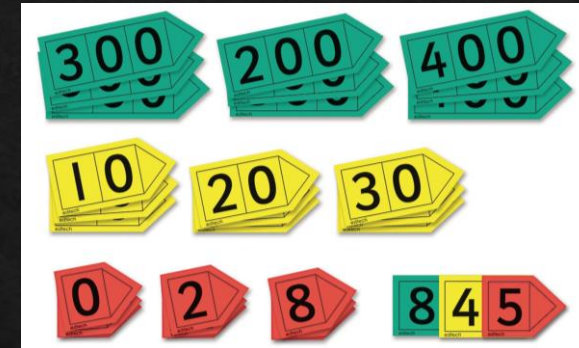
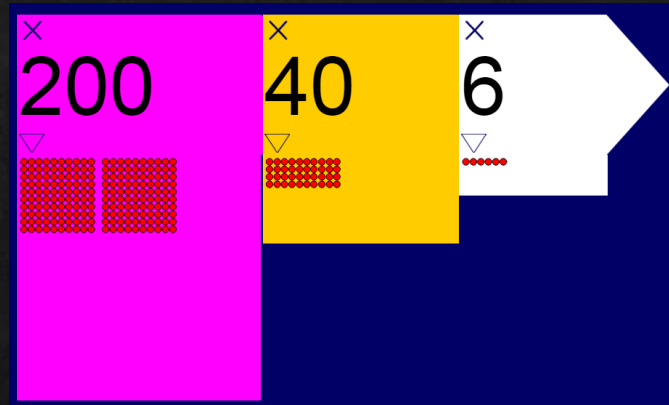
Author: Jill Trinder, University of Greenwich

PV Game

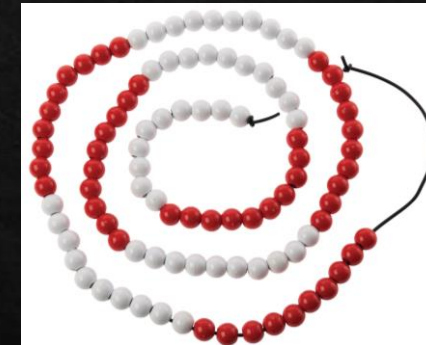
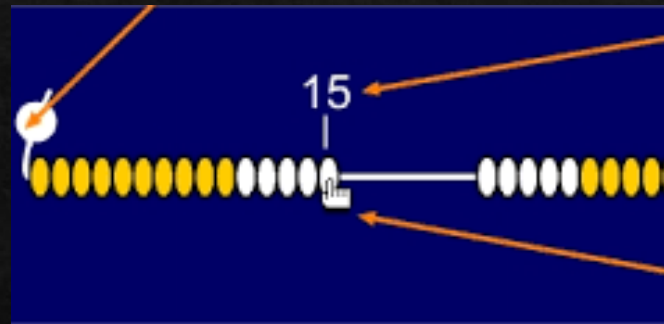


Concrete and Pictorial Power

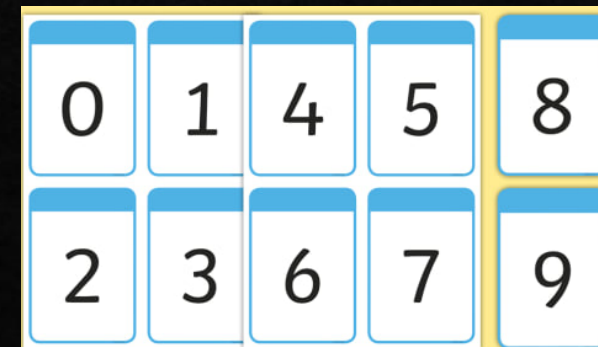
◇ Place value



◇ Beads



◇ Moving Digits



Number Squares

mask or highlight a row

click on a square to colour or uncolour it

common multiples are shown in both colours

use the mask to highlight or cover groups of numbers

mask or highlight a column

▷	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					49	50
▷	51	52	53	54		56	57		59	60
▷	61	62	63	64		66	67		69	70
▷	71	72	73	74					79	80
▷	81	82	83	84	85	86	87	88	89	90
▷	91	92	93	94	95	96	97	98	99	100

Counting in 2s

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

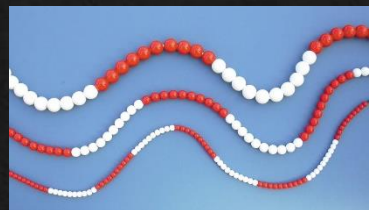
Counting in 4s

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

Some common resources which support the understanding of place value

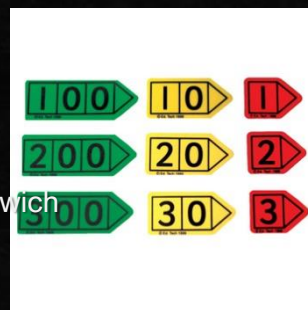
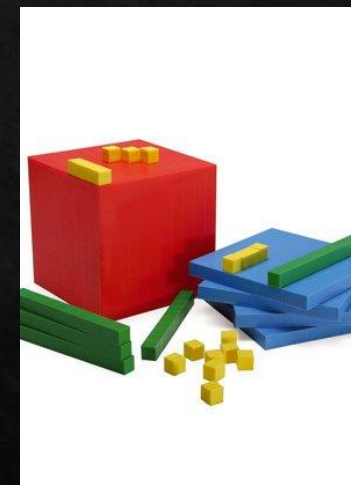


- ◆ Numicom
- ◆ Arrow Cards
- ◆ Money
- ◆ Straws
- ◆ Unifix / multilink



- ◆ 100 beads
- ◆ PV hats
- ◆ 100 grid
- ◆ Dienes
- ◆ Gattegno chart

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



100	500	300	400	200	900	100	800	600
10	50	30	40	20	90	10	80	60
1	5	3	4	2	9	1	8	6

Author: Jill Trinder, University of Greenwich

Sometimes, Always, Never true...

Is it **always**, **sometimes** or **never** true that if you add three numbers less than 10 the answer will be an odd number?

Is it **always**, **sometimes** or **never** true that when you multiply a whole number by 9, the sum of its digits is also a multiple of 9?

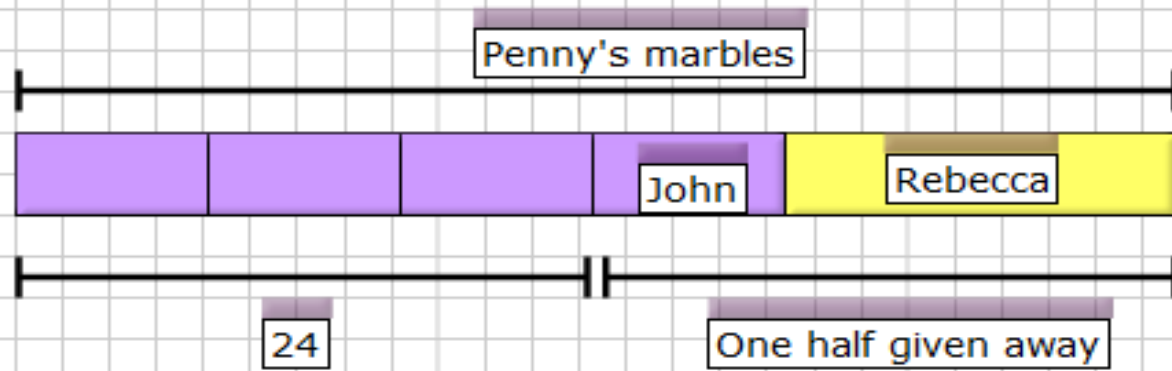
Using Mathematical Resources More Creatively




How would you solve this problem?

- ◇ Penny had a bag of marbles. She gave one-third of them to Rebecca, and then one quarter *of the remaining marbles* to John.
- ◇ Penny then had 24 marbles left in the bag.
- ◇ How many marbles were in the bag to start with?

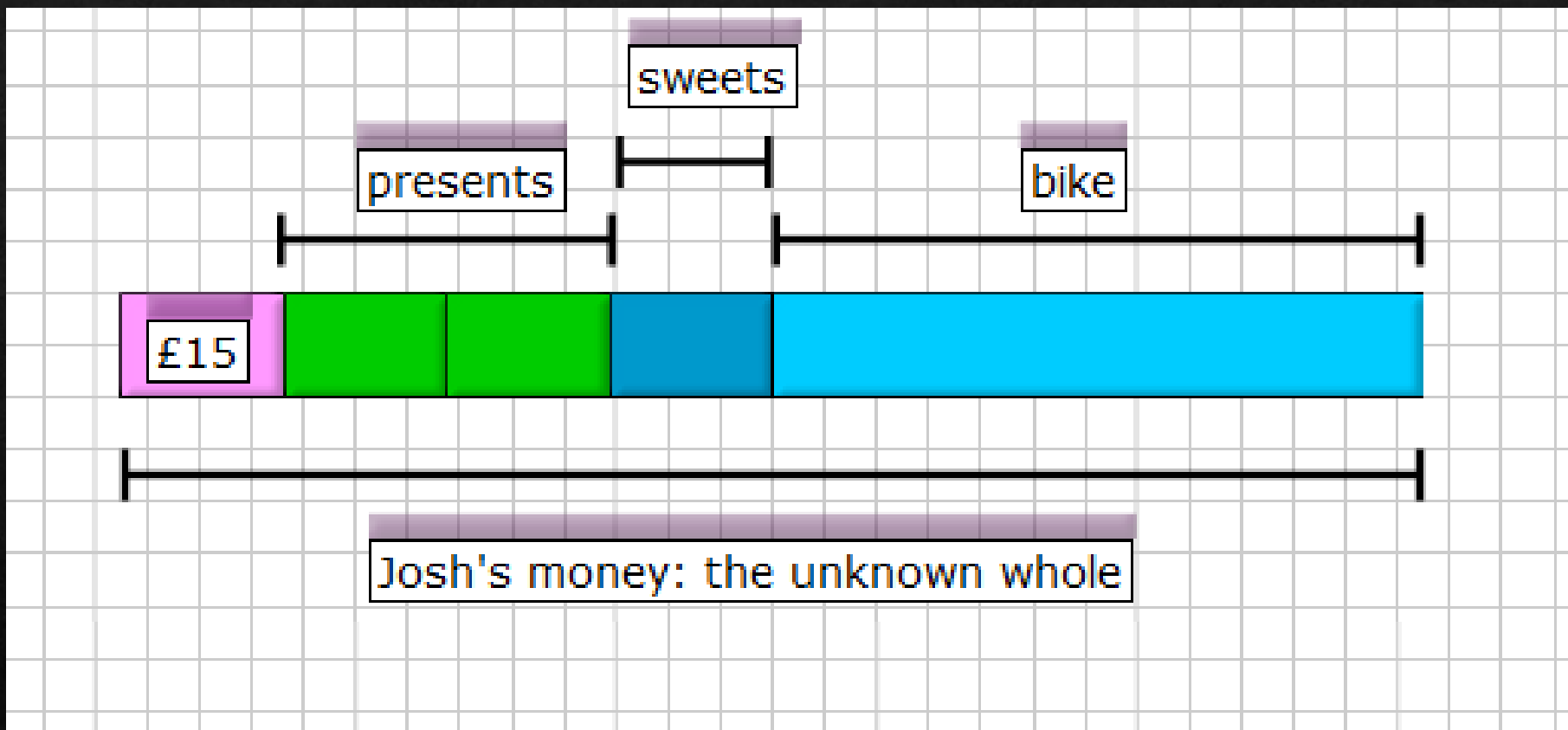
(Overall percent correct, Singapore: 81%, United States: 41%)




		Resize Blocks and Braces 40	Make Equal Parts 1	<input checked="" type="radio"/> Horizontal <input type="radio"/> Vertical		Problems	
<input checked="" type="radio"/> Solid Line <input type="radio"/> Dotted Line				Label	Reset	Full Screen	Undo
						Grid	
						Keyboard	Erase



Josh spends half his money on a bike.
He then spends a quarter of what is left on sweets.
He then spends two thirds of what is left on presents.
He now has £15 left.
How much did Josh have to start with?




Author: Jill Trinder, University of Greenwich
White Rose produce 'Barvember' materials every year for schools to use for free!



REPRESENTATIONS IN OUR PRIMARY VIDEO LESSONS

Mathematical structure, manipulatives and myth-busting



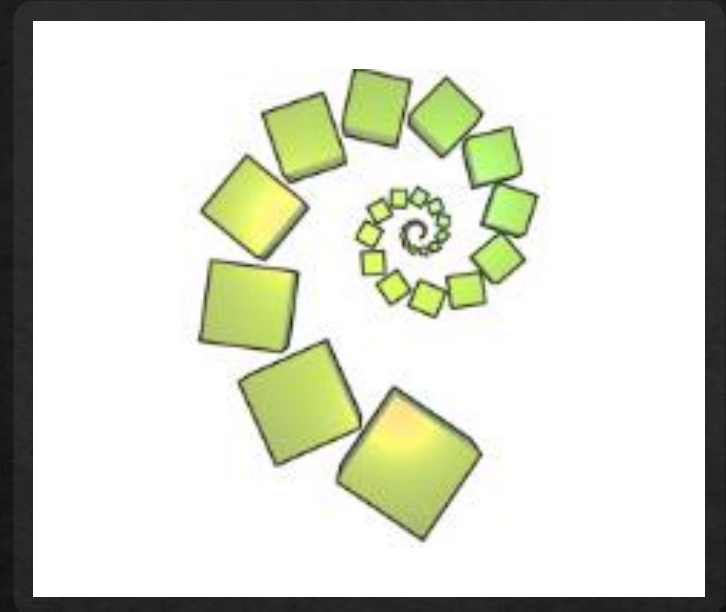
Primary Students Secondary Students Post 16 Early Years Primary Teachers Secondary Teachers

NRICH

age 16+

Manipulatives in the Primary Classroom

Age 5 to 11
Article by Jenni Back
Published 2013 Revised 2019



Places to go for more ideas...