

Maths Y3/4 Parent Workshop



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Aims of the session:

- Maths Curriculum overview.
- Mastery approach – CPA – Concrete, Pictorial, Abstract.
- Progression in written calculation methods:
 - addition and subtraction
 - multiplication and division

Mathematics

Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

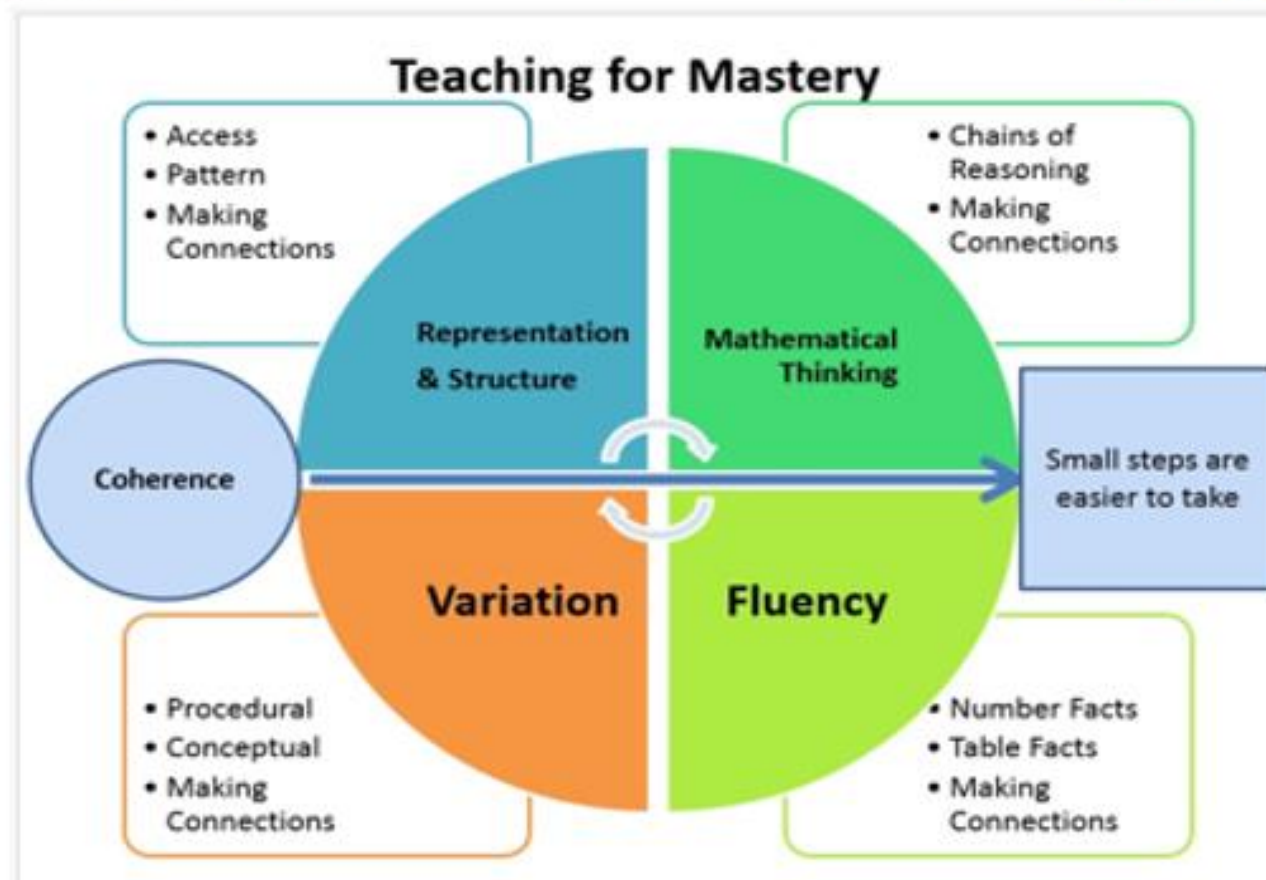


Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The 'Big Ideas' in the learning and teaching of mathematics



What is really possible?

- Mastery is the ultimate aim of learning.

In mathematics, this means having the ability to apply a skill to a new problem.

Mastery is not an end point, rather a philosophy to teaching and learning which is conducive to high expectations for all.



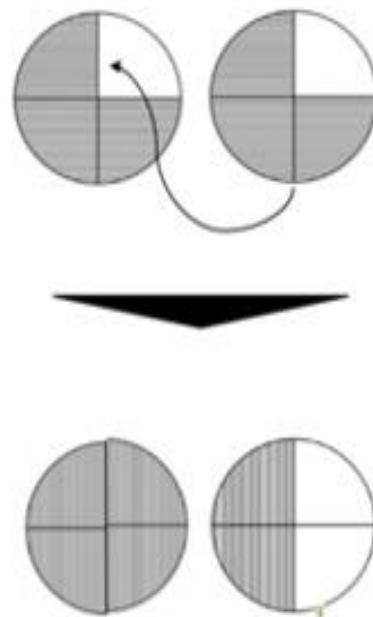
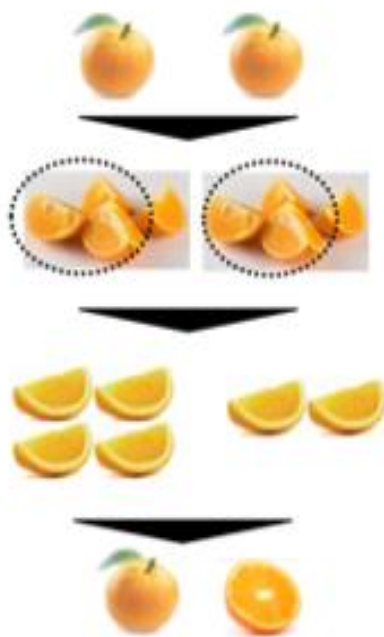
Everyone can do Maths.

A belief that, by working hard, all children are capable of succeeding at mathematics.

What is CPA?



What is $\frac{3}{4}$ of 2?



$$\frac{3}{4} \times 2 = \frac{6}{4}$$

$$= 1 \frac{1}{2}$$

Why is CPA useful?



- Transforming the way we teach mathematics
- Curriculum changes
- Essential in the approach of teaching for mastery
- Develops strong conceptual understanding leading to sustainable learning

CPA is not about getting answers quickly



The answer is just
the start of the journey

*Today's right answer won't
help you tomorrow
but today's right thinking
will help you tomorrow .*

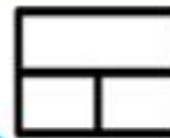
Dr. Yeap Ban Har

CPA is for everyone - all abilities and ages

Resources to help build concepts



1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009



TFM 'Checklist'

Can children:

- ✓ **Describe** it in their **own words**?
- ✓ **Represent** it in a **number of ways**?
- ✓ **Explain** it to someone else?
- ✓ Make up their **own examples**?
- ✓ **See connections** between the maths?
- ✓ **Recognise** it in **different contexts**?
- ✓ Make use of it in different ways?



Creating an inclusive, language rich environment

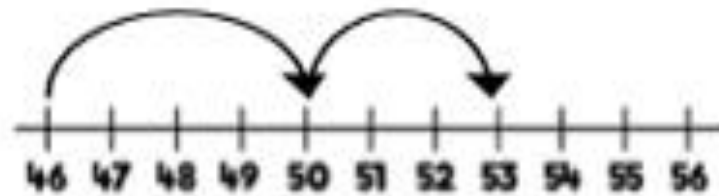


Y3 Addition

We can use Base 10 to solve $245 + 7$

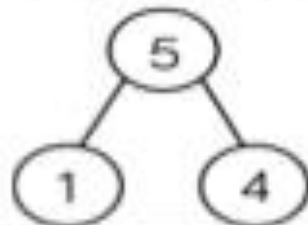


We can use a number line to calculate $346 + 7$



$$\begin{aligned} 46 + 4 &= 50 & 50 + 3 &= 53 \\ \text{so } 346 + 7 &= 353 \end{aligned}$$

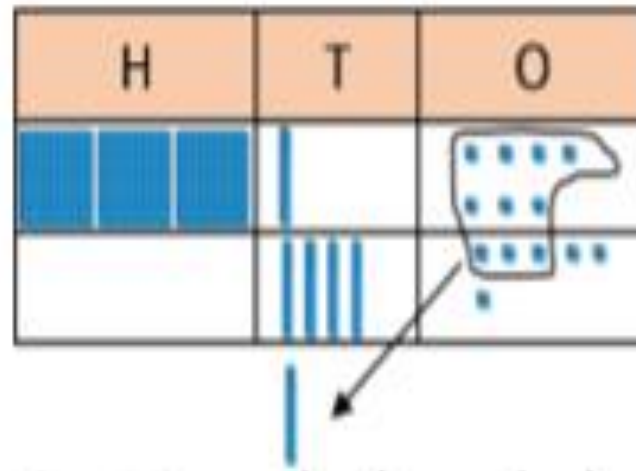
We can partition our 1-digit number to calculate $379 + 5$



$$379 + 1 = 380$$

$$380 + 4 = 384$$

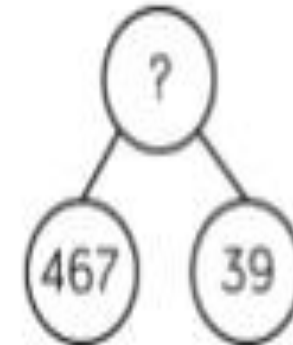
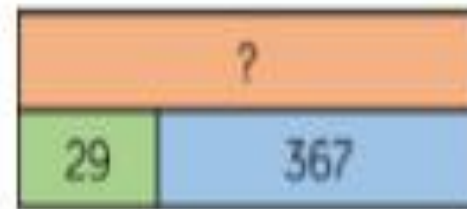
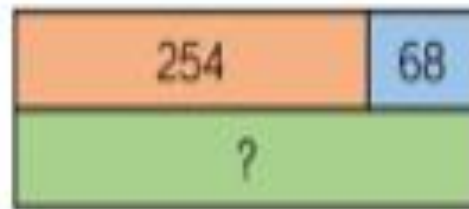
Annie uses Base 10 to calculate $317 + 46$



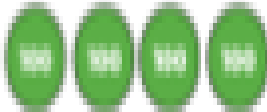
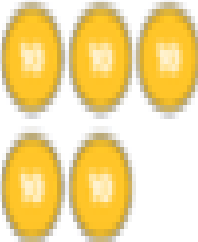
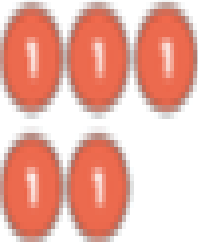
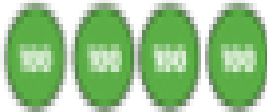

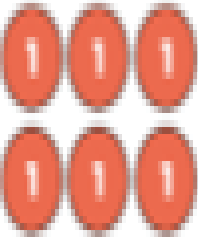
	3	1	7
+		4	6
	3	6	3

1

Complete the models using column addition.






Use place value counters to calculate $455 + 436$

H	T	O
		
		

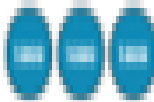



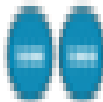
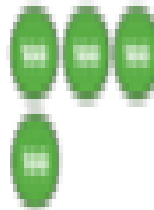
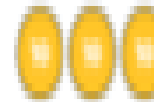
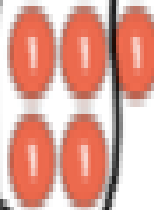
	4	5	5
+	4	3	6

Y4 Addition

Use counters and a place value grid to calculate $3,242 + 2,213$

1,000s	100s	10s	1s
			
			

Rosie uses counters to find the total of 3,356 and 2,435

Th	H	T	O
			
			



	Th	H	T	O
	3	3	5	6
+	2	4	3	5
	5	7	9	1

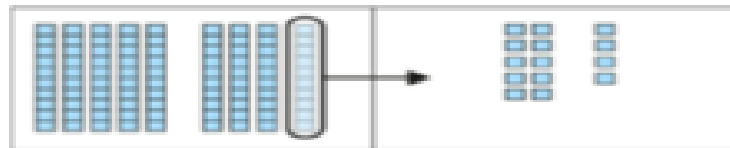
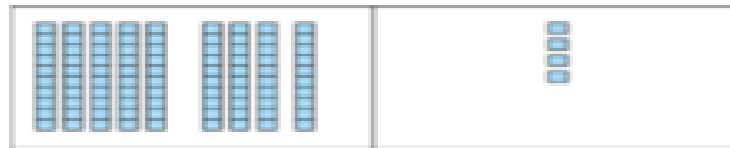
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Use the dot method to calculate

Y3 Subtraction

Example turn with Dienes and column subtraction:

$$94 - 6$$

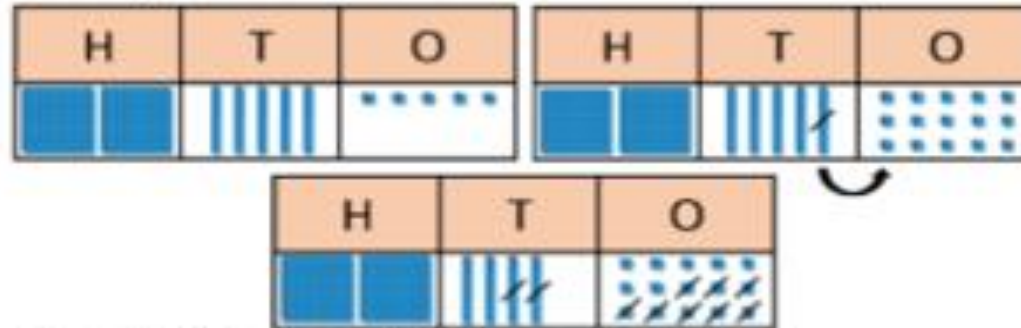


10s	1s
9	4
-	6

10s	1s
9 ⁸	¹ 4
-	6

10s	1s
9 ⁸	¹ 4
-	6
8	8

Teddy uses Base 10 to subtract 28 from 255



	2	4 ¹	5
-		2	8
	2	2	7

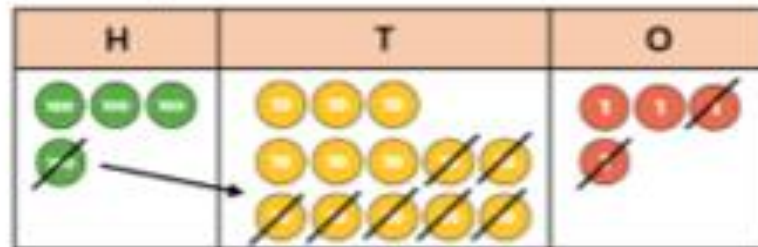
Use Teddy's method to calculate:

$$365 - 48$$

$$492 - 38$$

$$722 - 16$$

Alex uses place value counters to calculate $434 - 72$



	3 ¹	3	4
-		7	2
	3	6	2

Use Alex's method to calculate:

$$248 - 67$$

$$247 - 67$$

$$354 - 92$$

$$836 - 254 = 582$$

	^h	^t	^u
	800	130	6
-	200	50	4
	500	80	2

Begin by
partitioning
into pv
columns

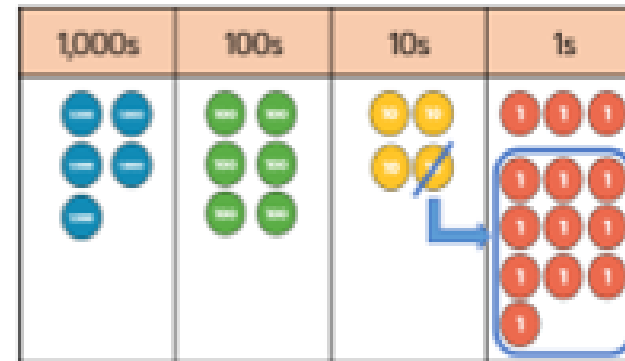
$$728 - 582 = 146$$

^h	^t	^u
7	2	8
5	8	2
1	4	6

Then move to
formal method.

Y4 Subtraction

Dexter is using place value counters to calculate $5,643 - 4,316$



	Th	H	T	O
	5	6	3	13
-	4	3	1	6
	1	3	2	7


Column subtractions:

$$\begin{array}{r} \overset{5}{\cancel{6}}, \overset{4}{\cancel{5}}, \overset{2}{\cancel{3}}, 8 \\ - \quad 2, 7, 8, 9 \\ \hline 3, 7, 4, 9 \end{array}$$

$$\begin{array}{r} \overset{2}{\cancel{3}}, \overset{6}{\cancel{7}}, \overset{2}{\cancel{3}}, 2 \\ - \quad \quad 8, 3, 7 \\ \hline 2, 8, 9, 5 \end{array}$$

Y3 Multiplication

Jack uses Base 10 to calculate 24×4

Tens	Ones
	
	
	
	

	T	O
	2	4
x		4
	9	6

1









Use Jack's method to solve:

$$13 \times 4$$

$$23 \times 4$$

$$26 \times 3$$

Amir uses place value counters to calculate 16×4

Tens	Ones
	
	
	
	

	T	O
	1	6
x		4
	6	4

2

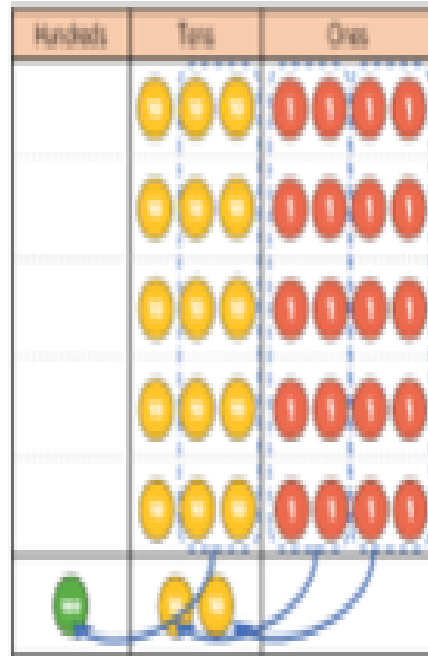
Use Amir's method to solve:

$$16 \times 6$$

$$17 \times 5$$

$$28 \times 3$$

Amir then calculates 5×34

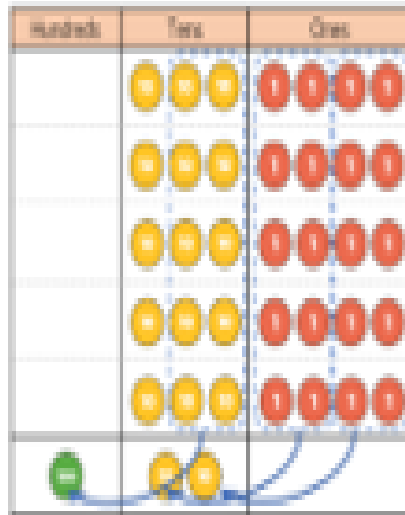


	T	O
	3	4
x		5
<hr/>		
1	7	0
<hr/>		
1	2	

Use Amir's method to
solve:
 36×6
 48×4

Y4 Multiplication

Whitney uses place value counters to calculate 5×34



	H	T	O		
		3	4		
x			5		
		2	0	(5 x 4)	
+	1	5	0	(5 x 30)	
	1	7	0		

Use Whitney's
method to solve

$$5 \times 42$$

$$23 \times 6$$

$$48 \times 3$$

Multiplication algorithm – expanded layout:

	1,000s	100s	10s	1s
		5	2	1
×				3
				3
			6	0
	1	5	0	0
	1	5	6	3

$3 \times 1 \text{ ones} = 3 \text{ ones}$

$3 \times 2 \text{ tens} = 6 \text{ tens}$

$3 \times 5 \text{ hundreds} = 15 \text{ hundreds}$

$= 1 \text{ thousand} + 5 \text{ hundreds}$

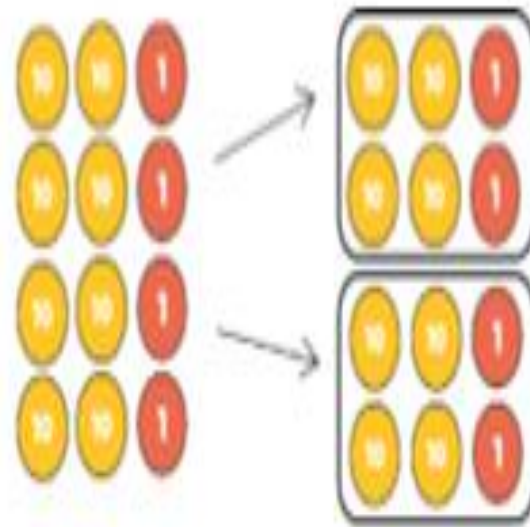
Multiplication algorithm – compact layout:

$$\begin{array}{r} 367 \\ \times 4 \\ \hline 1468 \\ 2 2 \\ \hline \end{array}$$

- *First, write the largest factor: "367".*
- *Then write the smallest factor below, lining up the digits: "4".*
- *Now multiply, starting with the ones: four times seven ones is equal to twenty-eight ones...*
- *...and regroup: twenty-eight ones is equal to two tens and eight ones; write "8" in the ones column and "2" below the tens column.*
- *Then move to the tens: four times six tens is equal to twenty-four tens...*
- *...and regroup: twenty-four tens is equal two hundreds and four tens...*
- *...and add the two tens from regrouping to give two hundreds and six tens; write "6" in the tens column and "2" below the hundreds column.*
- *Then move to the hundreds: four times three hundreds is equal to twelve hundreds...*
- *...and regroup: twelve hundreds is equal to one thousand and two hundreds...*
- *...and add the two hundreds from regrouping to give one thousand and four hundreds; write "1" in the thousands column and "4" in the hundreds column.*

Y3 Division

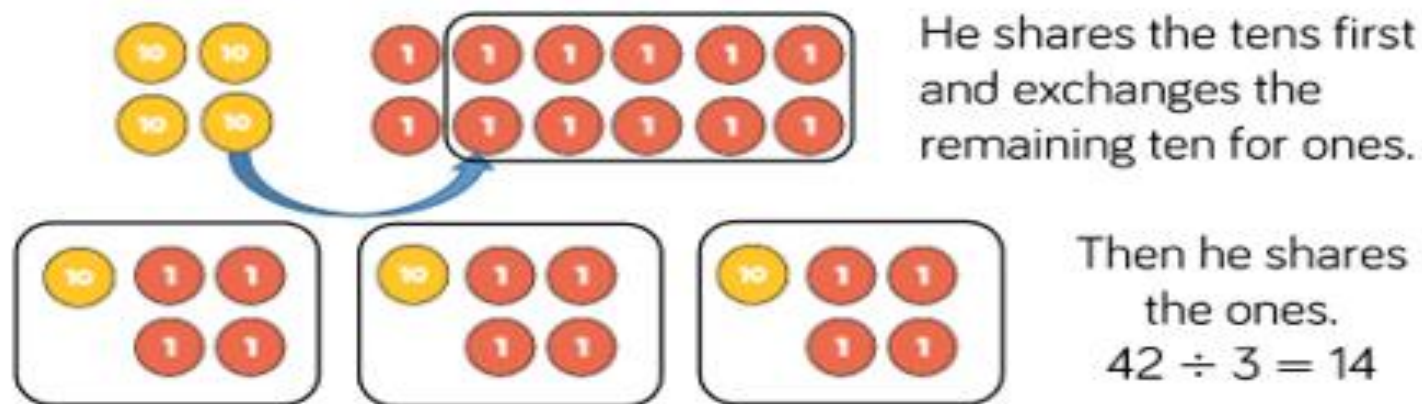
Ron uses place value counters to solve $84 \div 2$



I made 84 using place value counters and divided them between 2 equal groups.

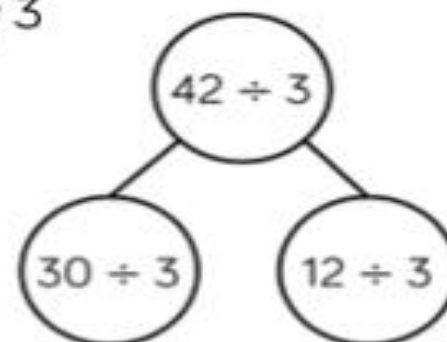


Ron uses place value counters to divide 42 into three equal groups.

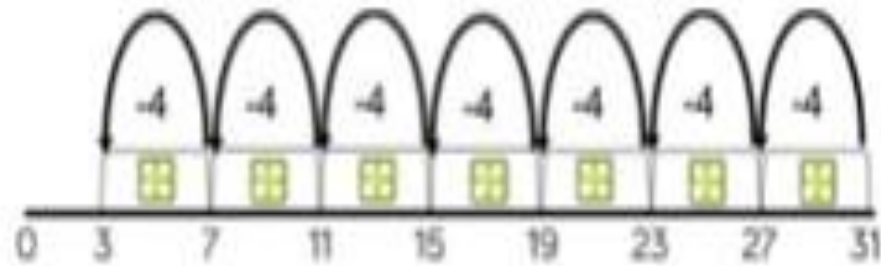


Annie uses a similar method to divide 42 by 3

Tens	Ones
10	1 1 1 1
10	1 1 1 1
10	1 1 1 1



Tommy uses repeated subtraction to solve $31 \div 4$



$$31 \div 4 = 7 \text{ r } 3$$



Y4 Division

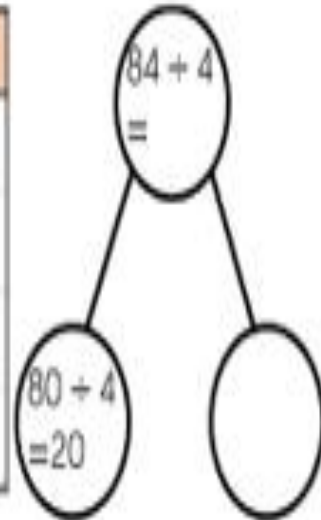
Jack is dividing 84 by 4 using place value counters.











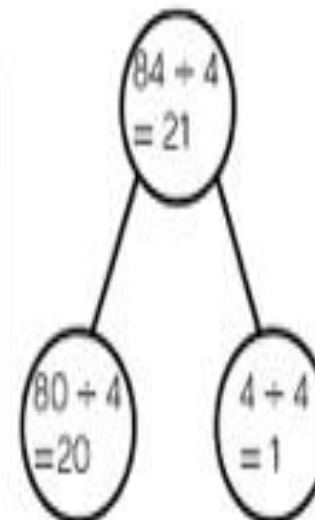
First, he divides the tens.

Then, he divides the ones.

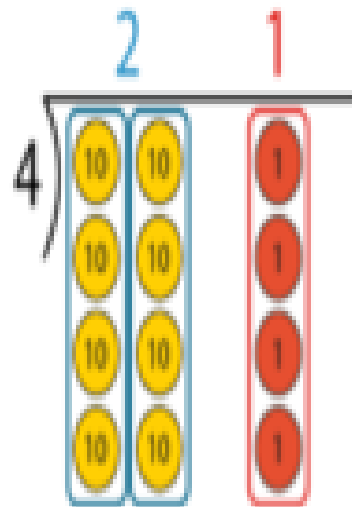
Tens	Ones
	
	
	
	



Tens	Ones
	
	
	
	



Algorithm with place-value counters – summary:



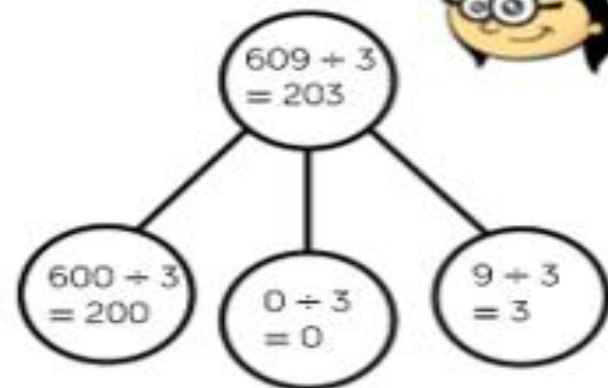
$8 \text{ tens} \div 4 = 2 \text{ tens}$

$4 \text{ ones} \div 4 = 1 \text{ one}$

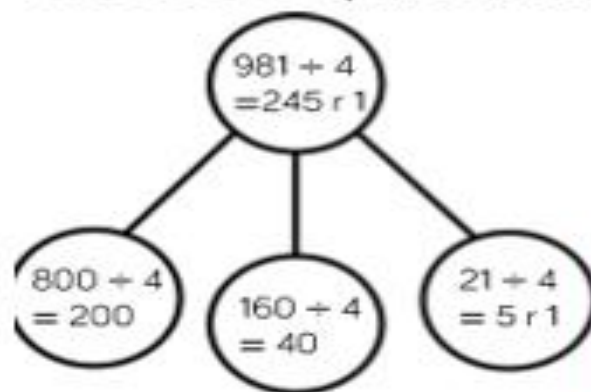
- 'Eight tens and four ones divided between four is equal to two tens and one one.'
- 'Each child gets twenty-one sticks.'

Annie is dividing 609 by 3 using place value counters.

Hundreds	Tens	Ones
100 100		1 1 1
100 100		1 1 1
100 100		1 1 1



Rosie is using flexible partitioning to divide 3-digit numbers. She uses her place value counters to support her.



Hundreds	Tens	Ones
1 1 1 1	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1



Use Rosie's method to solve:

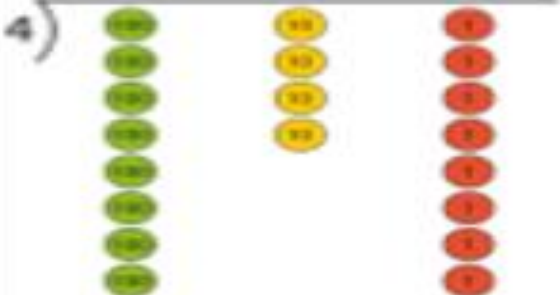

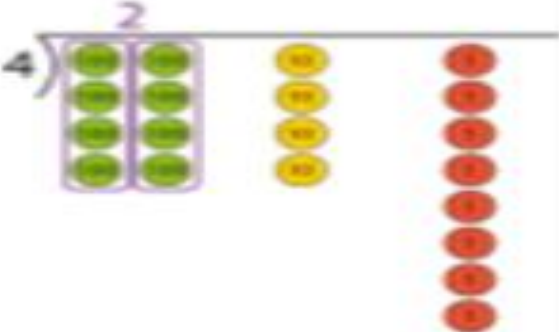

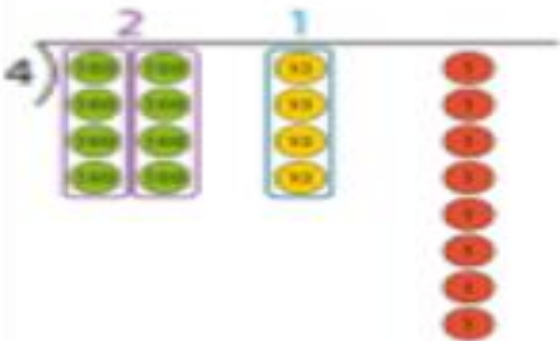

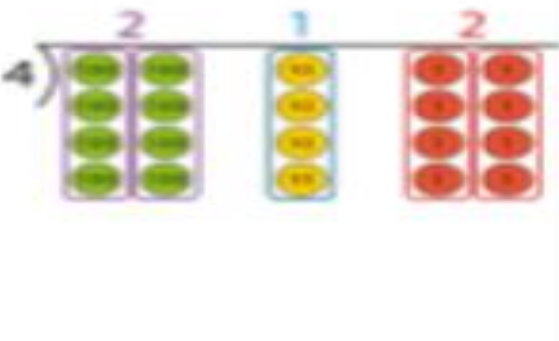

$$726 \div 6$$

$$846 \div 6$$

$$846 \div 7$$

Eight hundred and forty-eight pencils are shared equally between four year groups. How many pencils does each year group get?

$$848 \div 4 = ?$$

Step 1 – write the divisor and dividend		Step 2 – sharing the hundreds	
			
Eight hundred and forty-eight divided by four.		8 hundreds $\div 4 = 2$ hundreds "Write '2' in the hundreds column."	
Step 3 – sharing the tens		Step 4 – sharing the ones	
			
4 tens $\div 4 = 1$ ten "Write '1' in the tens column."		8 ones $\div 4 = 2$ ones "Write '2' in the ones column."	

Short division.

$$\begin{array}{r} 153 \\ 4 \overline{) 6212} \end{array}$$