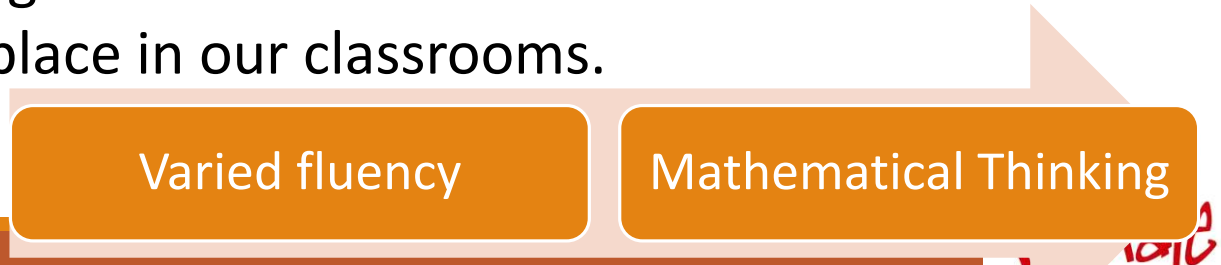
White Rose Maths at Finchale Primary School

At Finchale Primary School, we are working on a mastery approach for all of our pupils. This means that they are able to learn and use mathematics concepts in various ways, applying prior learning to new learning and making conscious links to this prior learning.
Within the mastery approach, our pupils work on having a firm understanding of the maths 'behind' what they do. This is what we refer to as varied fluency work. They then apply this knowledge to mathematical thinking questions in various ways. For this, they may have to solve a problem, give an explanation or solve a 'never, sometimes, maybe' question.
For example, our pupils would work on knowing how to carry out addition sums (appropriate for their year group) and then apply this by solving mathematical thinking questions about addition in various contexts.

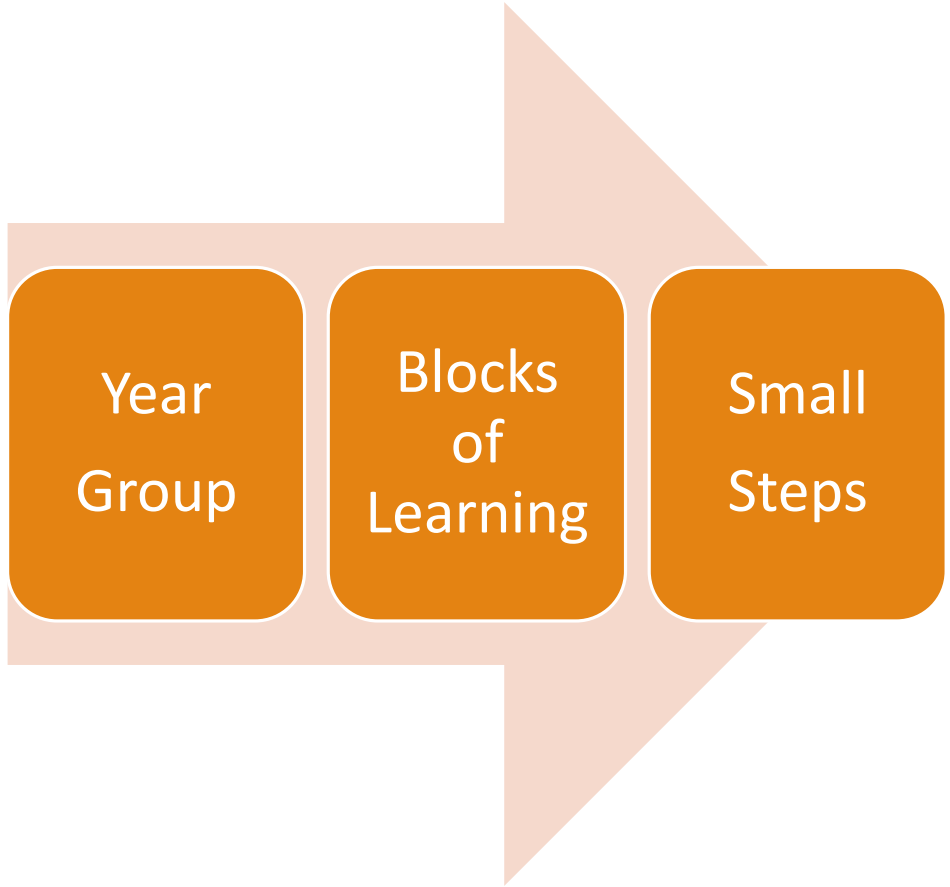
This is a journey for our pupils, building on 'small steps' throughout each unit of work, across a year group and as they move through school.
To support our work on the mastery approach, we are part of a maths hub with Carmel College. This allows us to access additional training for all members of staff to enhance our teaching and support and the learning that takes place in our classrooms.



In school, we use White Rose Maths booklets in our maths lessons to promote our mastery approach and then enhance this work with further mathematical thinking questions.

White Rose Maths follows a clear scheme of learning for each year group with a clear time-linked plan for learning.

Every year group, from Reception to Year 6, follow blocks of learning and within each of these blocks there are small steps. These small steps build upon one another to sequence learning. Lessons that are earlier in a block of learning, or earlier in the year, may be built upon at a later date or the skills learned may be applied within another context. For example learning about factors of a number is then used within work on simplifying fractions, rules of divisibility and long division.



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Within our lessons, we take a concrete, pictorial and abstract (CPA) approach to mathematics.

Concrete

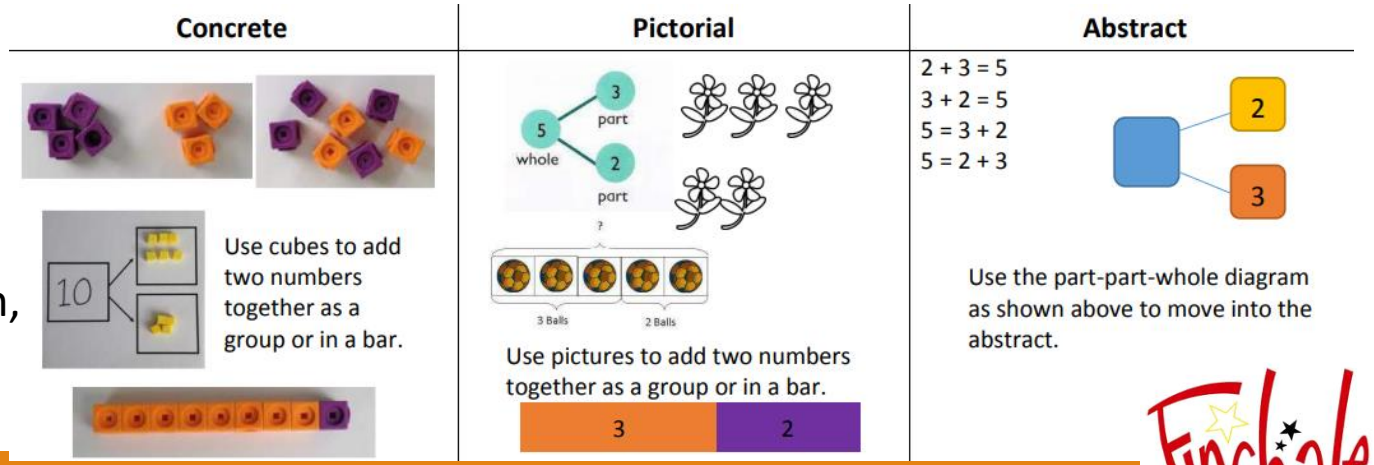
Concrete is the 'doing' stage. During this stage, our pupils use concrete objects to model problems. Unlike traditional maths teaching methods where teachers demonstrate how to solve a problem, the CPA approach brings concepts to life by allowing children to experience and handle physical (concrete) objects. With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.

Pictorial

Pictorial is the 'seeing' stage. Here, visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.
Building or drawing a model makes it easier for children to grasp difficult abstract concepts (for example, fractions). Simply put, it helps students visualise abstract problems and make them more accessible.

Abstract

Abstract is the 'symbolic' stage, where children use abstract symbols to model problems. Pupils will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem. The abstract stage involves the teacher introducing abstract concepts (for example, mathematical symbols). Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols (for example, +, –, x, ÷) to indicate addition, subtraction, multiplication or division.



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Stem sentences

Stem sentences are used to help pupils scaffold their thinking with different questions. Some describe a key concept and generally include missing parts to be completed. For example, '(number) is greater than (number).' This simple sentence can be populated in different ways and in different situations, depending on the context and challenge of the question, such as '17 is greater than 7' or '8.21 is greater than 1.32.'

It also helps our pupils to focus on the maths involved.

Stem sentences are used during whole class teaching using a 'I say, we say, you say' approach. This gives children the confidence to say it aloud with others before using it independently. It also helps to scaffold their mathematical thinking answers.

_____ is greater / less than _____

so _____ is greater / less than _____

The previous multiple of 10,000 is _____

The next multiple of 10,000 is _____

_____ is closer to _____ than _____

427,241 rounded to the nearest 10,000 is _____

Reception Blocks of Learning.

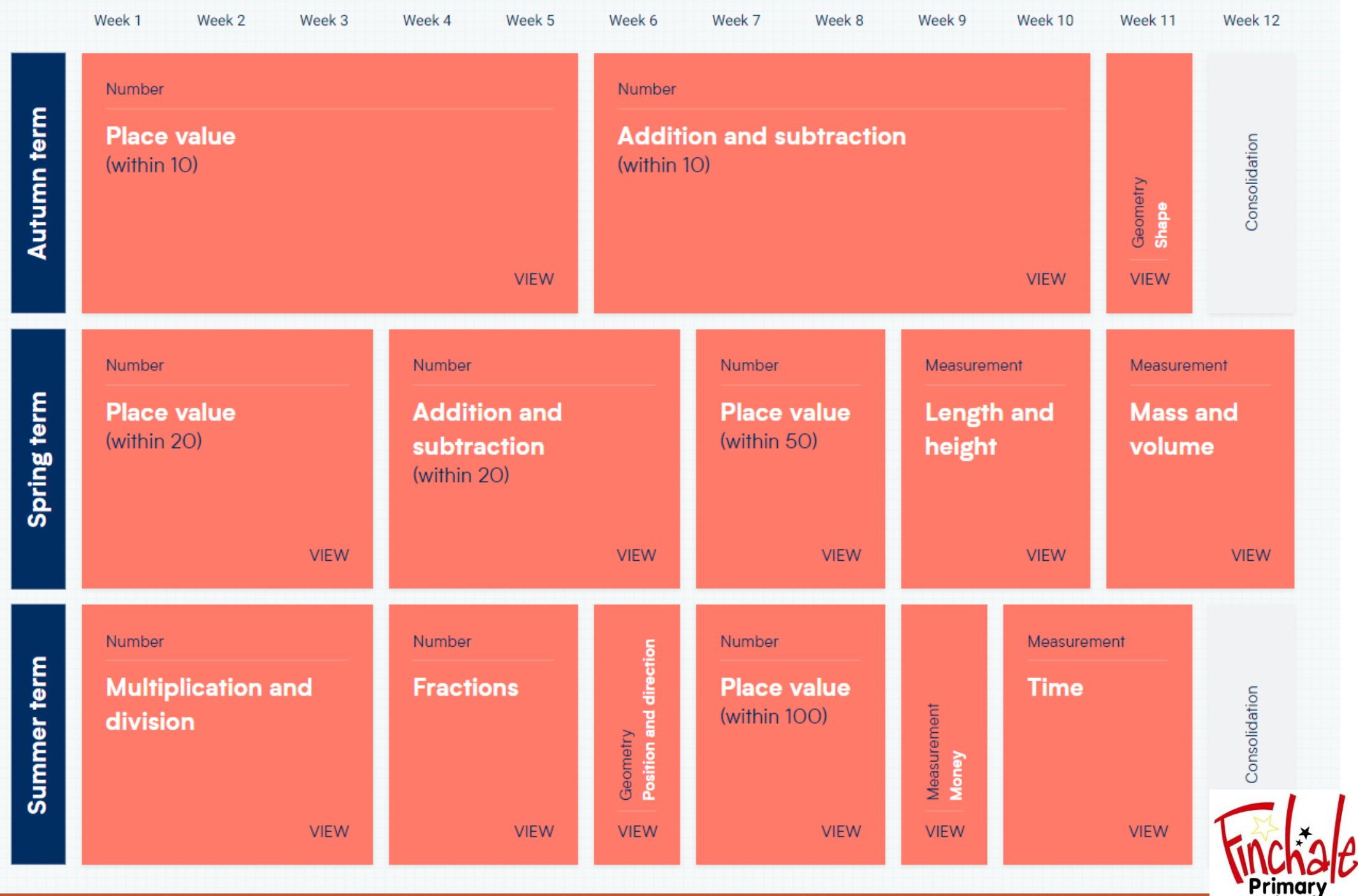
In Reception, our children carry out a lot of hands on, practical work with concrete resources. They begin with a whole class session introducing what they will be looking at and then they work in small groups with an adult.

Tasks are very practical.

In addition to this, children have access to indoor and outdoor continuous provision to support their mathematical development.

Children also have daily Time for Rhyme sessions where they enjoy singing a variety of songs linked to the maths curriculum.

Year 1 Blocks of Learning.



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Step 1	Sort objects
Step 2	Count objects
Step 3	Count objects from a larger group
Step 4	Represent objects
Step 5	Recognise numbers as words
Step 6	Count on from any number
Step 7	1 more
Step 8	Count backwards within 10
Step 9	1 less
Step 10	Compare groups by matching
Step 11	Fewer, more, same
Step 12	Less than, greater than, equal to
Step 13	Compare numbers
Step 14	Order objects and numbers
Step 15	The number line

Year 1 Small Steps:
Block 1 Place Value

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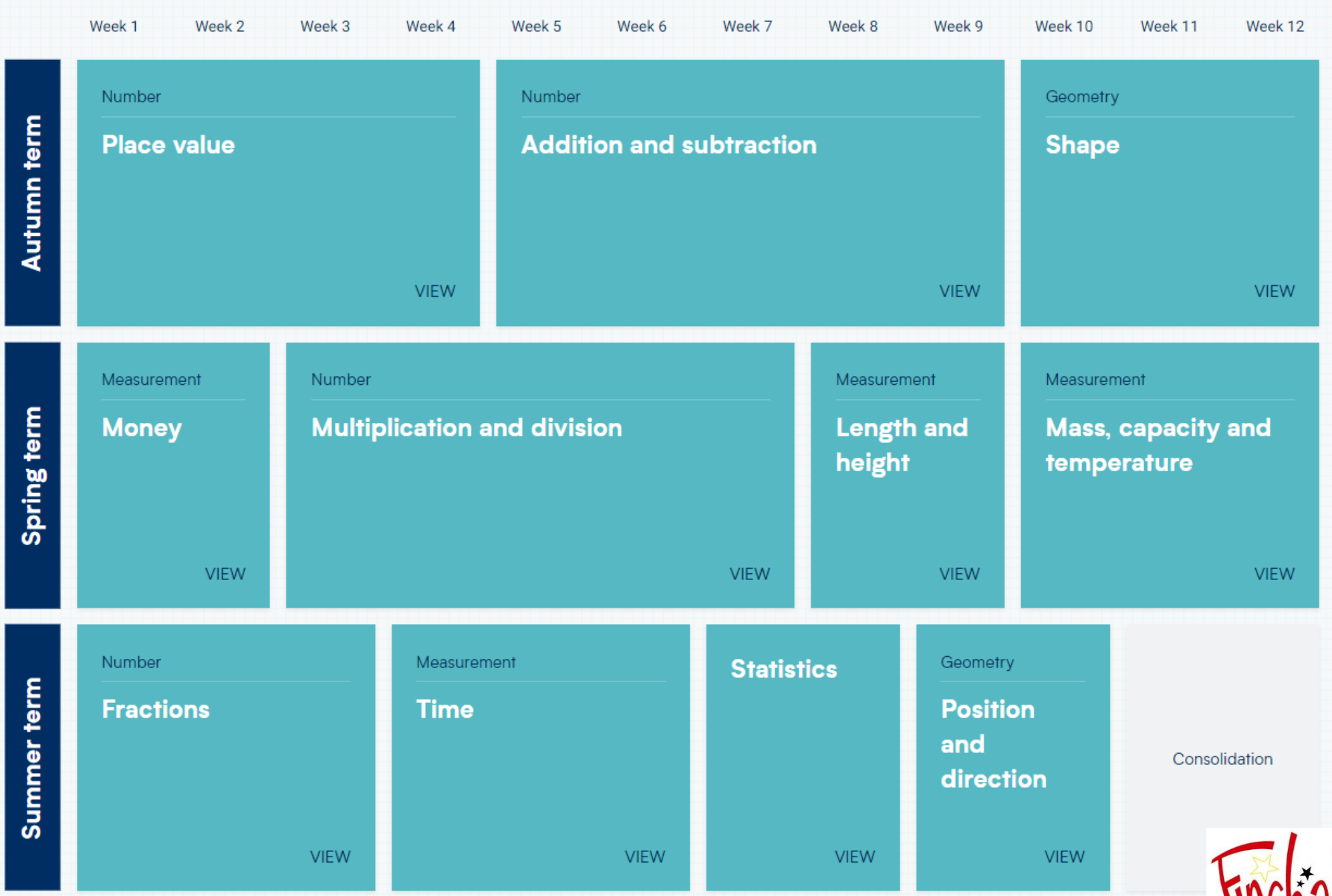
Year 2 Blocks of Learning.



Year 2 Small Steps: Block 2 Addition and Subtraction

Step 1	Bonds to 10
Step 2	Fact families - addition and subtraction bonds within 20
Step 3	Related facts
Step 4	Bonds to 100 (tens)
Step 5	Add and subtract 1s
Step 6	Add by making 10
Step 7	Add three 1-digit numbers
Step 8	Add to the next 10
Step 9	Add across a 10
Step 10	Subtract across 10
Step 11	Subtract from a 10
Step 12	Subtract a 1-digit number from a 2-digit number (across a 10)
Step 13	10 more, 10 less
Step 14	Add and subtract 10s
Step 15	Add two 2-digit numbers (not across a 10)
Step 16	Add two 2-digit numbers (across a 10)
Step 17	Subtract two 2-digit numbers (not across a 10)
Step 18	Subtract two 2-digit numbers (across a 10)
Step 19	Mixed addition and subtraction
Step 20	Compare number sentences
Step 21	Missing number problems

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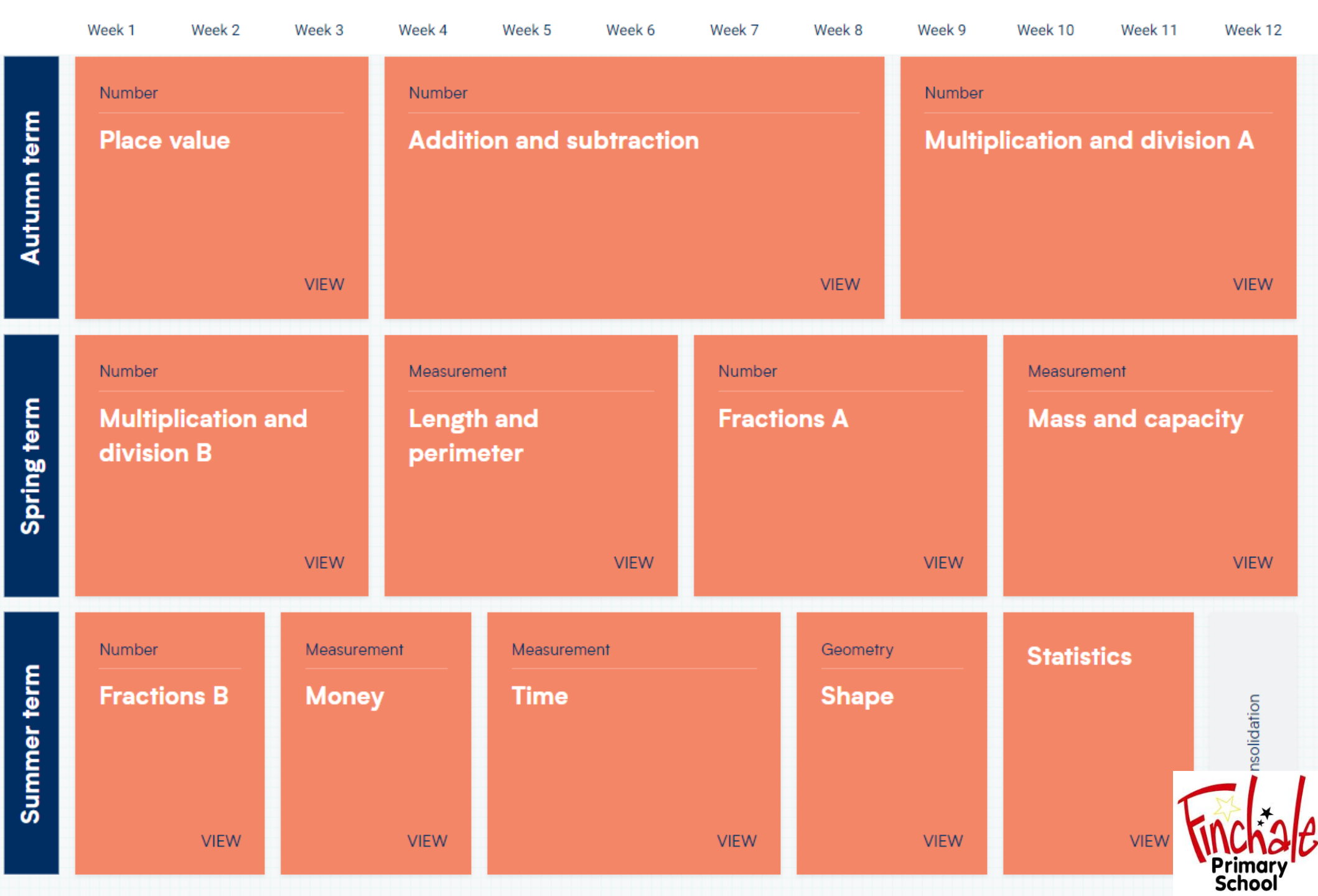
Year 3 Blocks of Learning.



Year 3 Small Steps: Block 2 Addition and Subtraction

Step 1	Apply number bonds within 10
Step 2	Add and subtract 1s
Step 3	Add and subtract 10s
Step 4	Add and subtract 100s
Step 5	Spot the pattern
Step 6	Add 1s across a 10
Step 7	Add 10s across a 100
Step 8	Subtract 1s across a10
Step 9	Subtract 10s across a 100
Step 10	Make connections
Step 11	Add two numbers (no exchange)
Step 12	Subtract two numbers (no exchange)
Step 13	Add two numbers (across a 10)
Step 14	Add two numbers (across a 100)
Step 15	Subtract two numbers (across a 10)
Step 16	Subtract two numbers (across a 100)
Step 17	Add 2-digit and 3-digit numbers
Step 18	Subtract a 2-digit number from a 3-digit number
Step 19	Complements to 100
Step 20	Estimate answers
Step 21	Inverse operations
Step 22	Make decisions

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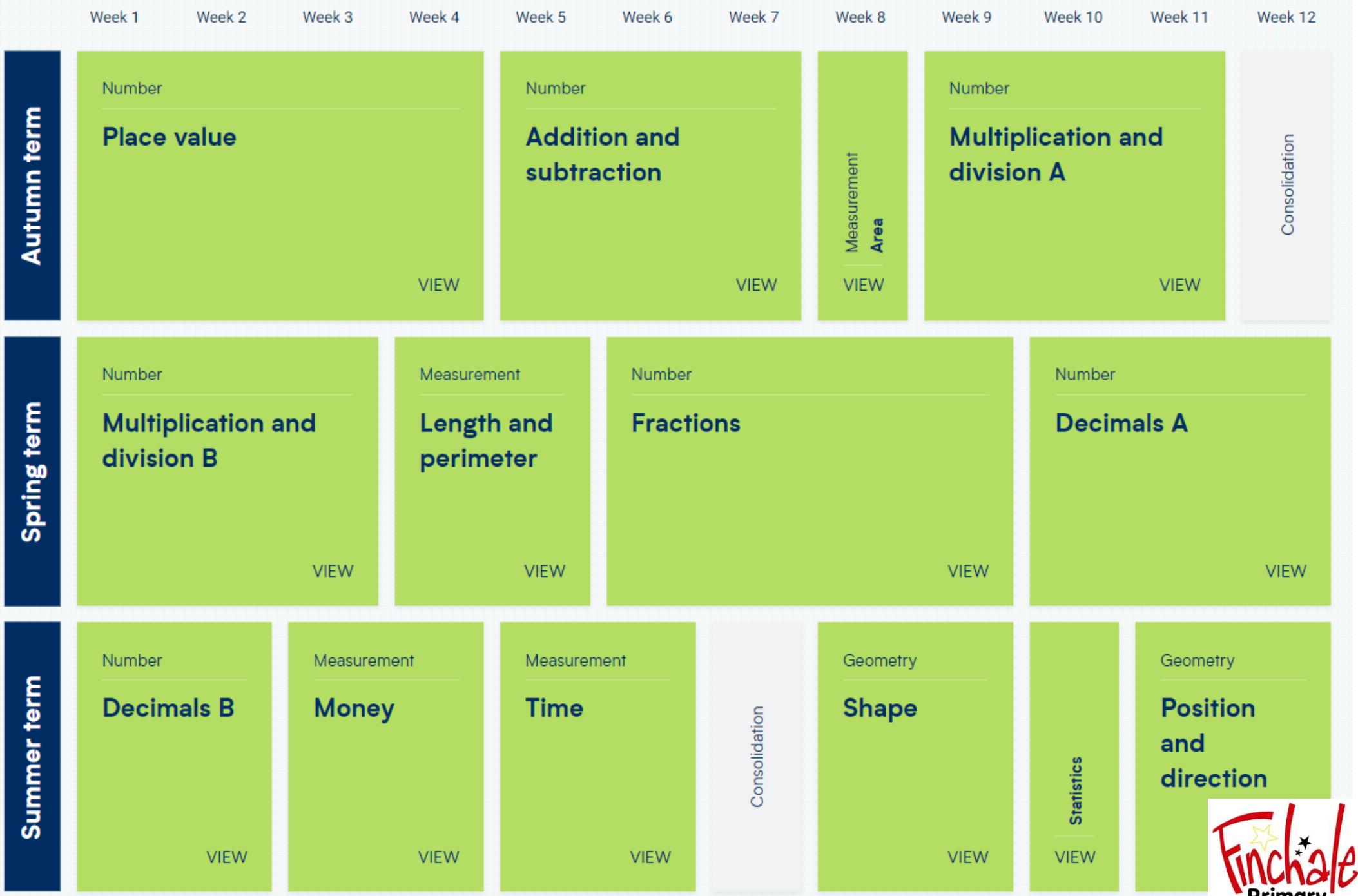
Year 4 Blocks of Learning.



Step 1	Add and subtract 1s, 10s, 100s and 1,000s
Step 2	Add up to two 4-digit numbers – no exchange
Step 3	Add two 4-digit numbers – one exchange
Step 4	Add two 4-digit numbers – more than one exchange
Step 5	Subtract two 4-digit numbers – no exchange
Step 6	Subtract two 4-digit numbers – one exchange
Step 7	Subtract two 4-digit numbers – more than one exchange
Step 8	Efficient subtraction
Step 9	Estimate answers
Step 10	Checking strategies

Year 4 Small Steps: Block 2 Addition and Subtraction

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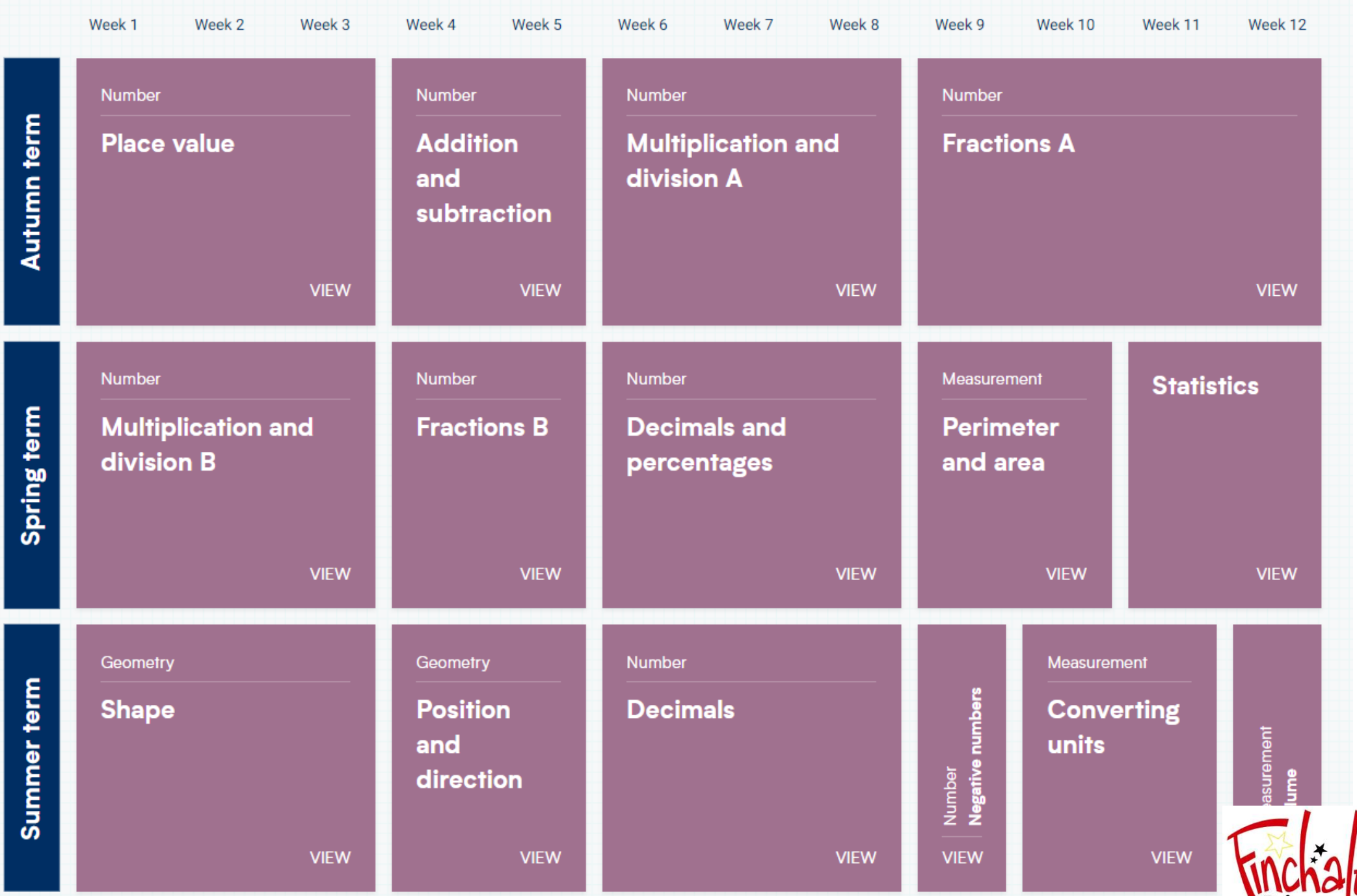
Year 5 Blocks of Learning.



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Step 1	Mental strategies
Step 2	Add whole numbers with more than four digits
Step 3	Subtract whole numbers with more than four digits
Step 4	Round to check answers
Step 5	Inverse operations (addition and subtraction)
Step 6	Multi-step addition and subtraction problems
Step 7	Compare calculations
Step 8	Find missing numbers

Year 5 Small Steps: Block 2 Addition and Subtraction

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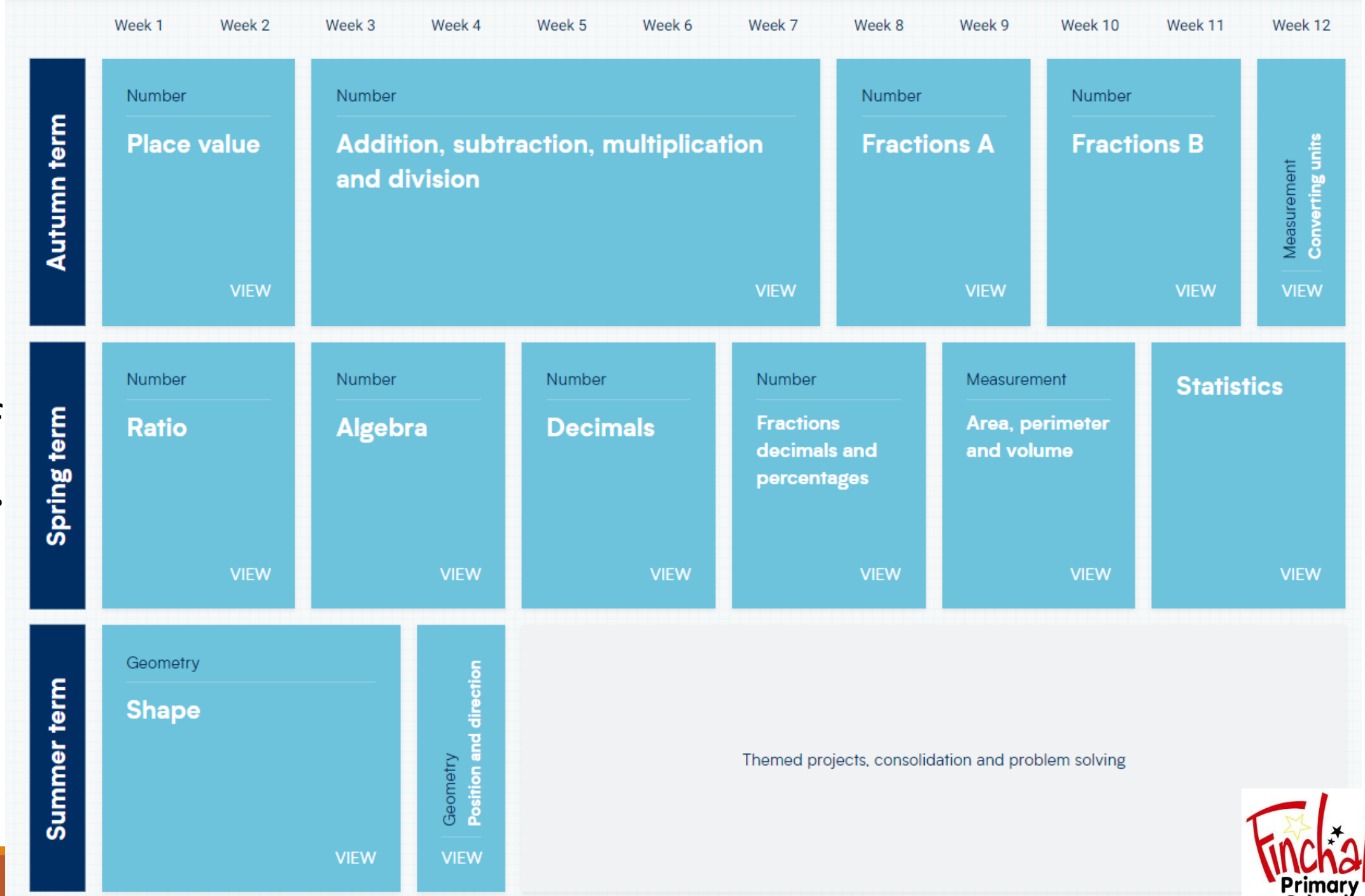
Year 6 Blocks of Learning.



Step 1	Add and subtract integers	Step 9	Short division
Step 2	Common factors	Step 10	Division using factors
Step 3	Common multiples	Step 11	Introduction to long division
Step 4	Rules of divisibility	Step 12	Long division with remainders
Step 5	Primes to 100	Step 13	Solve problems with division
Step 6	Square and cube numbers	Step 14	Solve multi-step problems
Step 7	Multiply up to a 4-digit number by a 2-digit number	Step 15	Order of operations
Step 8	Solve problems with multiplication	Step 16	Mental calculations and estimation
		Step 17	Reason from known facts

Year 6 Small Steps:
Block 2 Addition, Subtraction, Multiplication and Division

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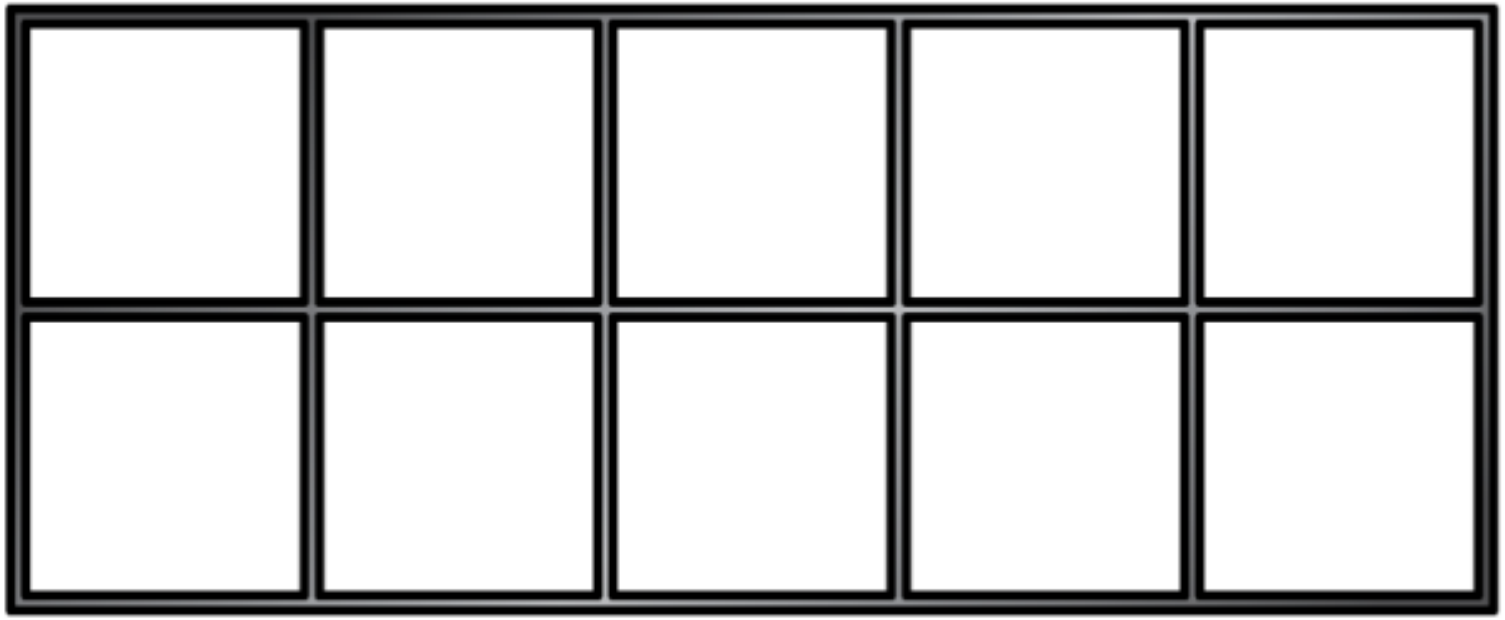
Ten Frames



Used for counting, place value, adding and subtracting amongst many other ways. They are also very useful for identifying number bonds to 10 etc.

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Place Value Chart

Hundreds	Tens	Ones

Having a secure knowledge of place value is essential so that our pupils can approach different areas of maths with confidence. Place value charts (along with the counters or base ten) are used in various ways throughout school from understanding what a number is worth to multiplying and dividing numbers by 10, 100 and 1,000.

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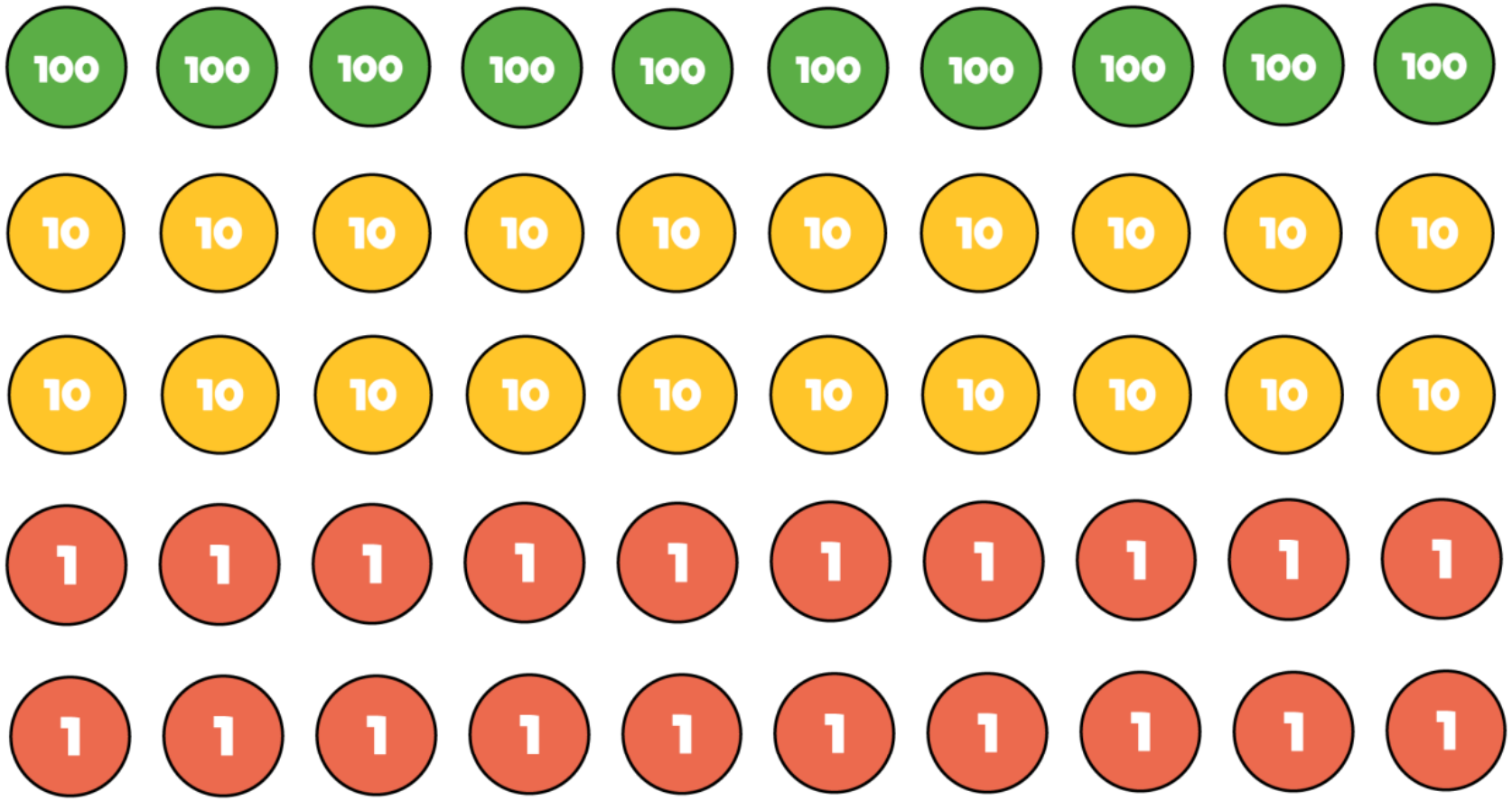
Place Value Counters



Our pupils will begin with using place value counters with values on them. The values they work with increase as they move through school.

As our pupils get older, they may use plain counters.

They will then progress to drawing counters on to a place value chart, once they have that secure knowledge.

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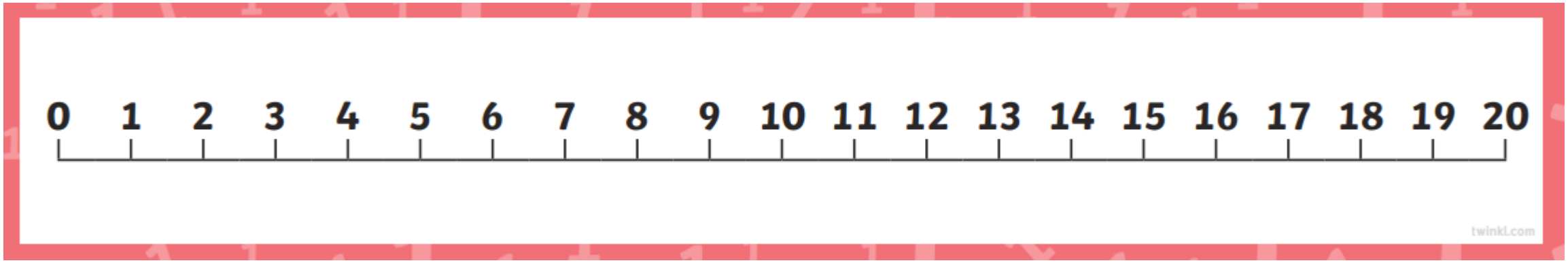
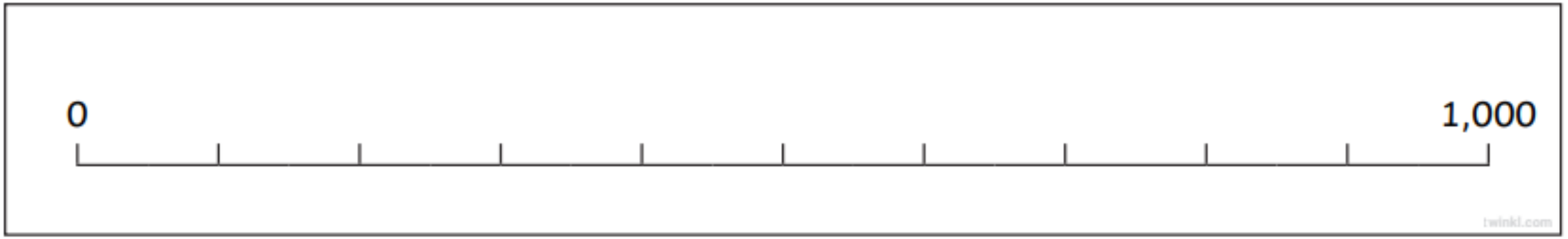
Number lines





Base Ten

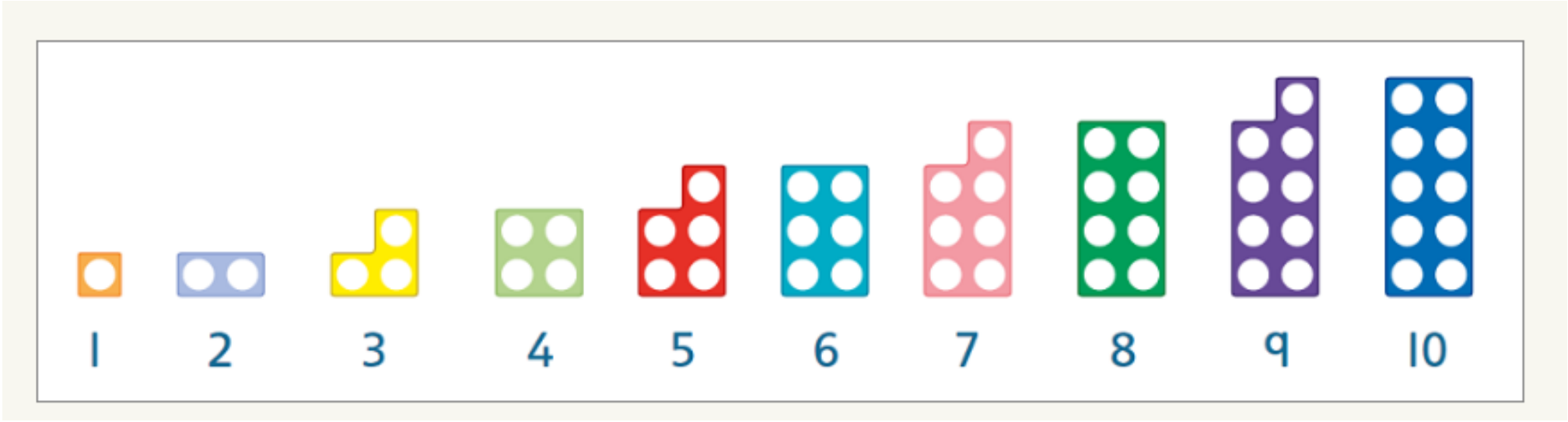
These are used to enhance pupils' understanding of place value.

Each of the yellow cubes represents 1, the green sticks are worth 10, the blue cuboids are worth 100 and the red cubes are worth 1,000. They help children to see and understand the value of a number.

Rekenrek

Rekenreks are great for subitising and for recognising number bonds to 5, 10 and 20. They are also used for problem solving within numbers up to 20.
As a school, pupils in Reception, Year 1 and Year 2, are completing work using these several times a week through focused sessions.

Numicon



Numicon is an approach to teaching maths that helps pupils to see connections between numbers. It supports our pupils as they learn early maths skills in primary school. It is a multi-sensory way of learning, which means our pupils learn by seeing and feeling.

100 Square

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 squares can be used to help teach addition, subtraction, multiplication and number bonds.

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Multiplication Square

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

A multiplication number square is useful to allow children to learn multiplication, division square numbers and recurring patterns.

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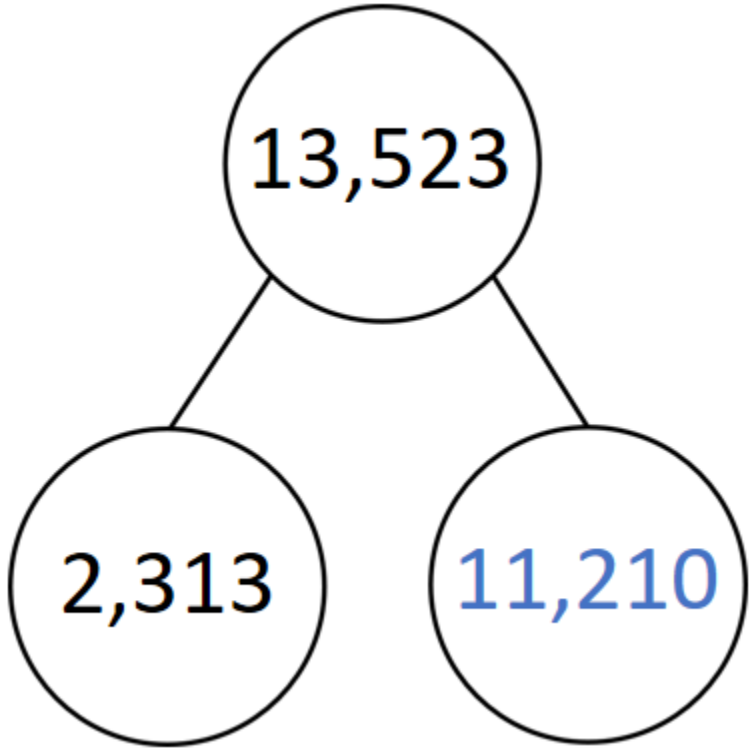
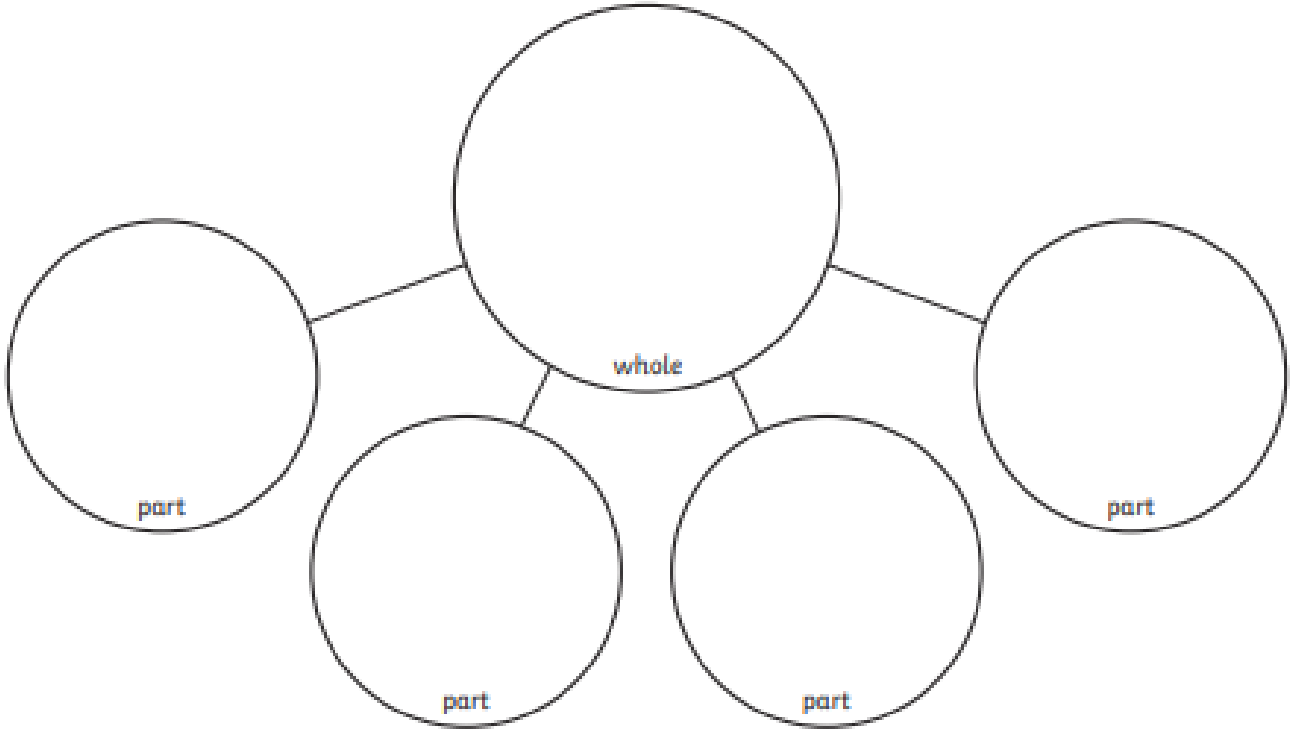
Part Whole Model





Whole − part = part

Part + part + part + part = whole

These part whole models help our pupils to understand how numbers can be split into different parts. They are used to see addition and subtraction and how they directly relate to one another.

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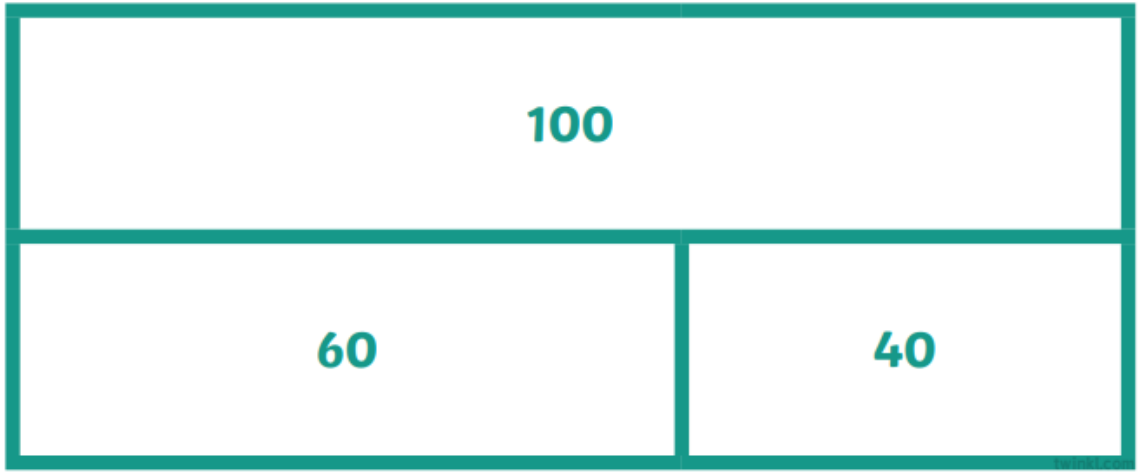
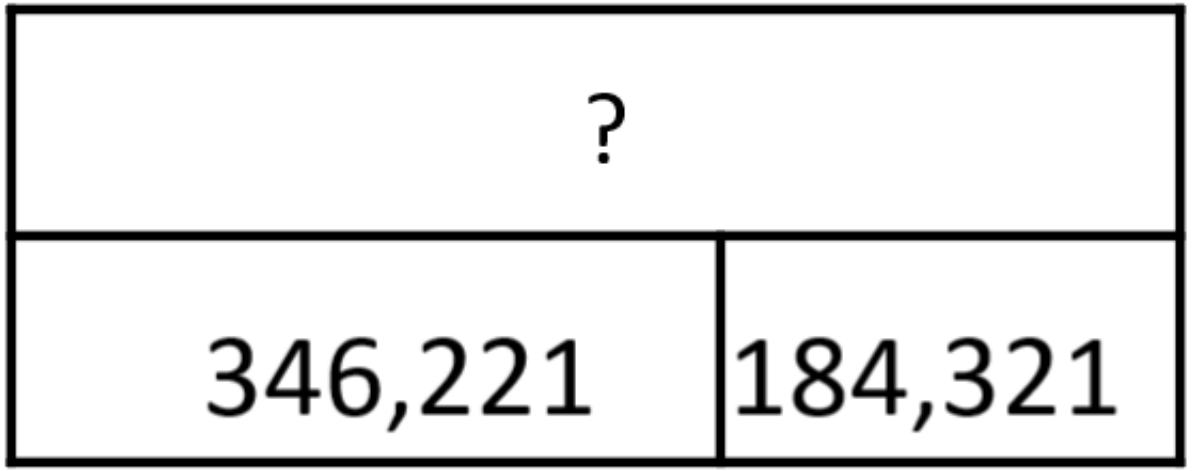
Bar Model





Whole − part = part

Part + part = whole

Reception Copy and Continue Simple Patterns

Continue the pattern.

The _____ will come next.

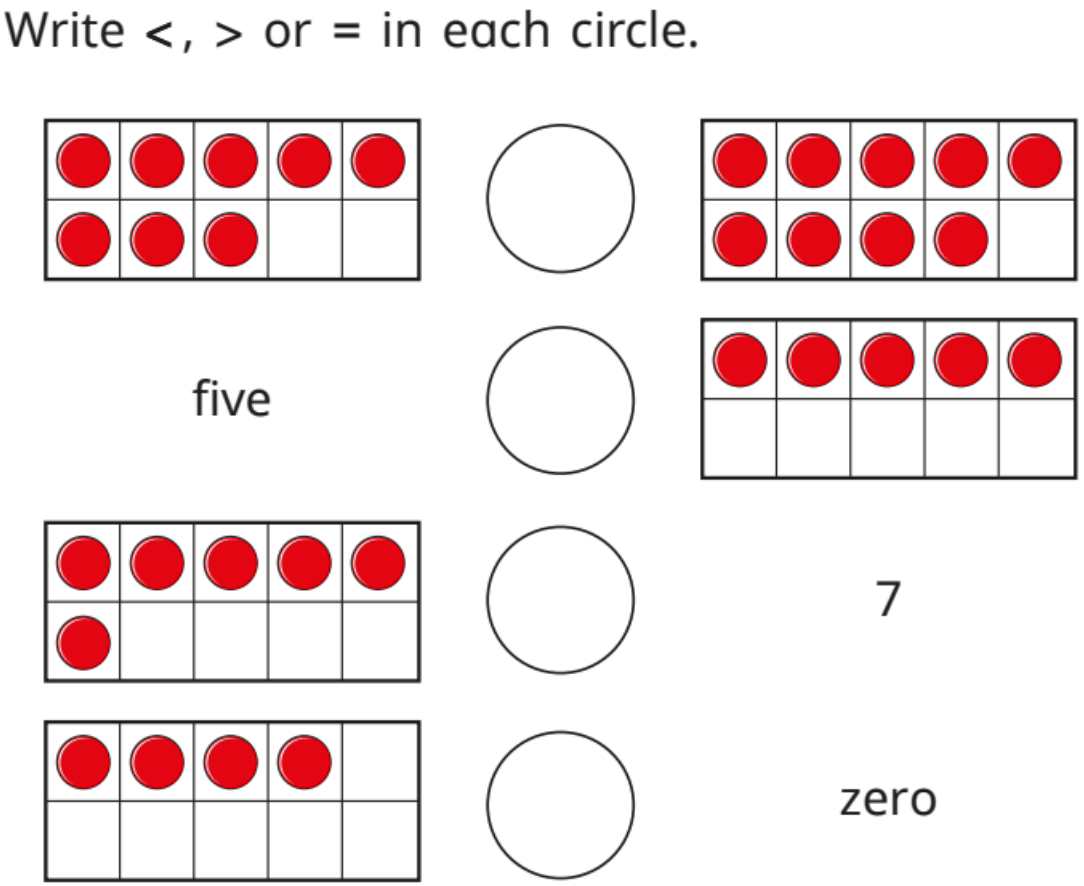
Could you use the ten frames and counters to complete the questions?

Year 1 Place Value to 10
(Less than, greater than, equal to)

< Less than 3 < 5 3 is less than 5

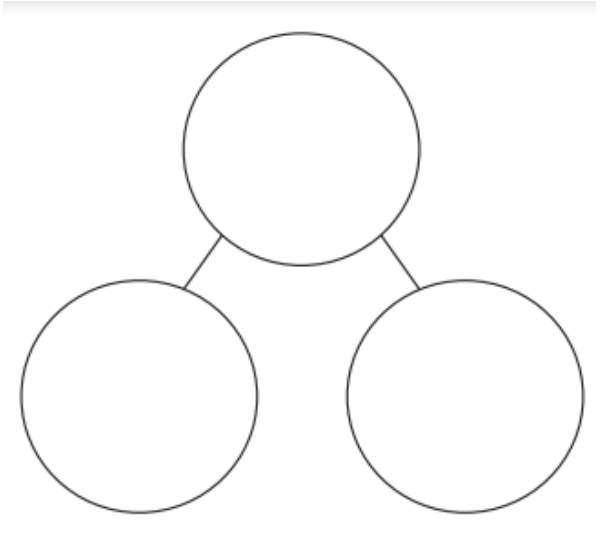
> Greater than 8 > 4 8 is greater than 4

= equals/the same/ is equal to
8 = 8

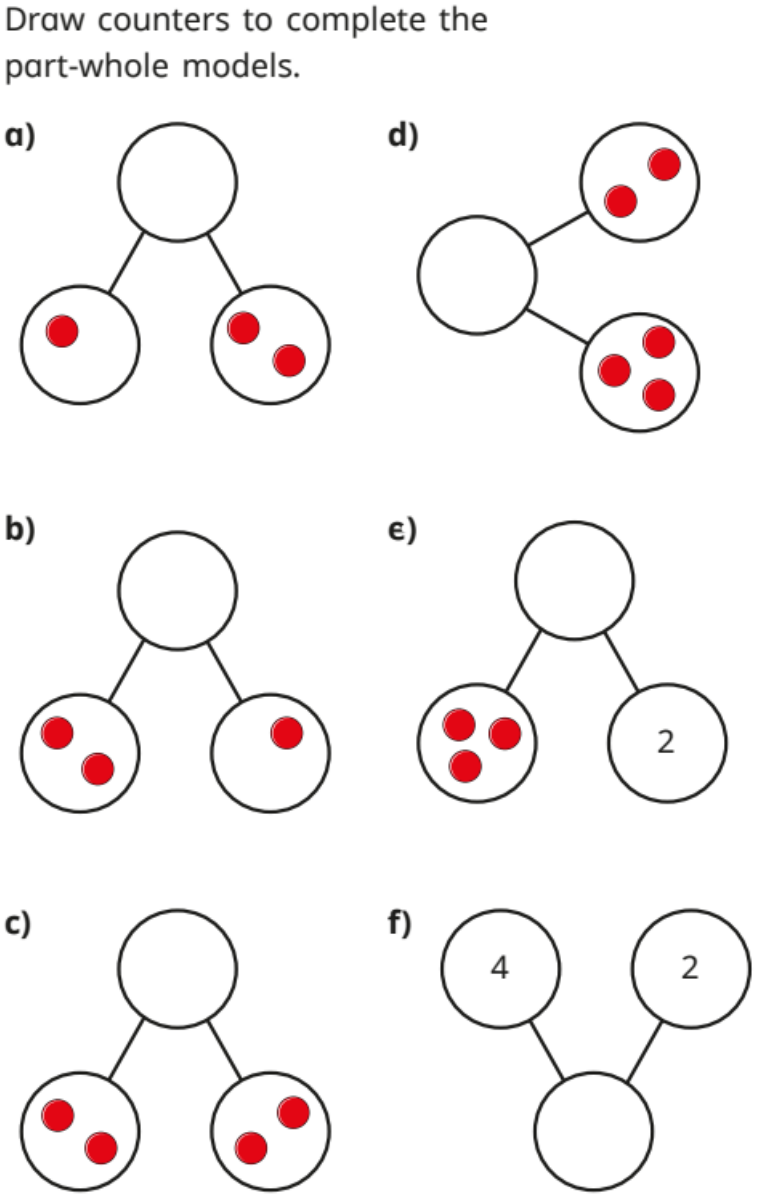


Year 1 Addition and Subtraction (Part-whole model)

Could you complete the part whole models?
Use the counters to help you.



whole − part = part
Part + part = whole

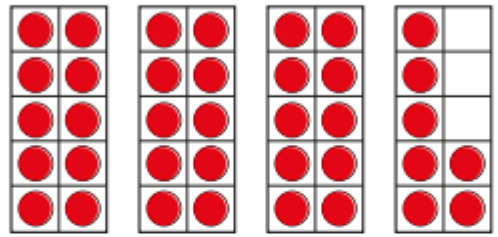


Year 2 Place Value to 100

(Recognise tens and ones)

Can you complete the questions? Use the resources to help you.

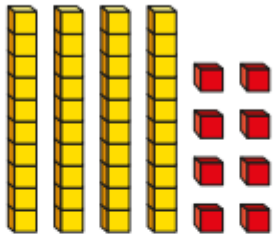
Complete the sentences to describe the counters.



There are ☐ tens and ☐ ones.

The number is ☐

Complete the sentences to describe the base 10



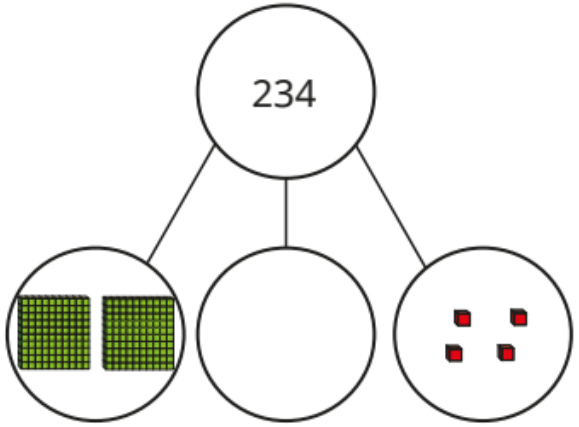
There are ☐ tens and ☐ ones.

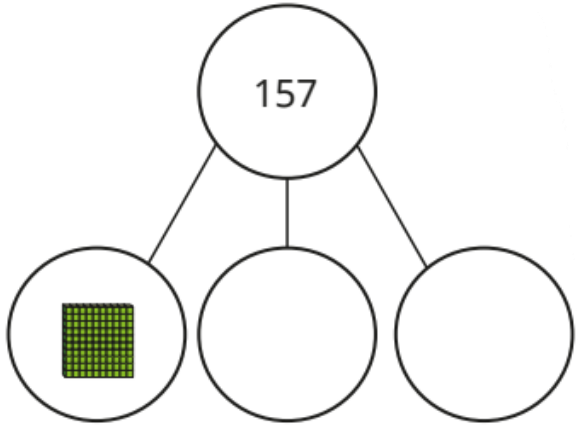
The number is ☐

Year 3 Place Value Partition Numbers to 1,000

Can you use the Base Ten to help you?

Complete the part-whole models and sentences.





234 = _____ _____ = ☐

Mathematical Thinking

a) Mo has 3 digit cards.

1	4	9

He makes a 3-digit number.

His number has 9 tens.

What numbers could Mo have made?

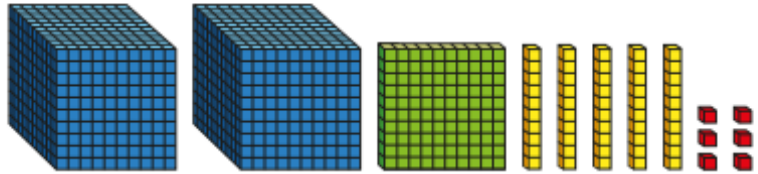
☐ or ☐

Year 4 Place Value Partition numbers to 10,000

Can you use the Base Ten, counters and place value charts to help you?

Complete the number sentences.

a)



2,156 = 2,000 + ☐ + ☐ + ☐

b)

3,421 = ☐ + ☐ + ☐ + ☐

c)

Th	H	T	O
1,000 1,000 1,000 1,000	100 100	10 10 10 10 10 10 10 10	1 1 1 1 1

4,285 = ☐ + ☐ + ☐ + ☐

Mathematical Thinking

Alex has four digit cards.

1	2	3	6

a) She makes a 4-digit number.

The digit in the thousands column is double the size of the digit in the tens column.

What numbers could Alex have made?

_____

_____

b) Next, Alex uses all the digit cards to make an even number.

What numbers could Alex have made?

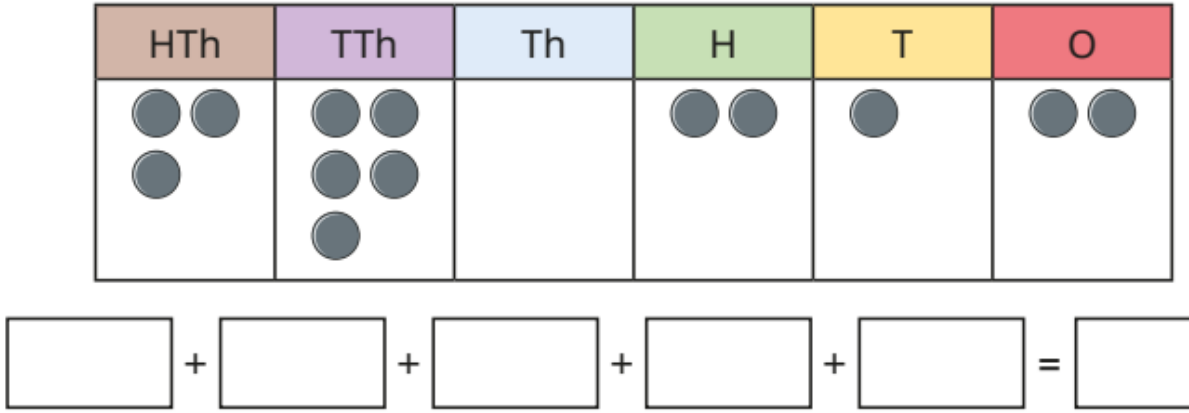
_____

_____

Year 5 Place Value to 1,000,000

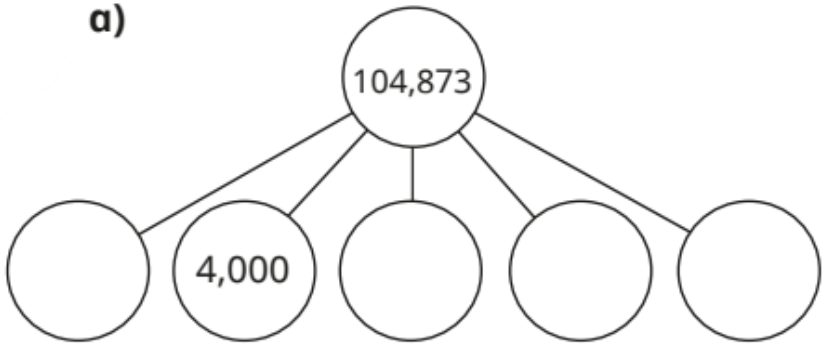
We have now shifted to a pictorial representation and an abstract form.

Complete the number sentence to partition the number.

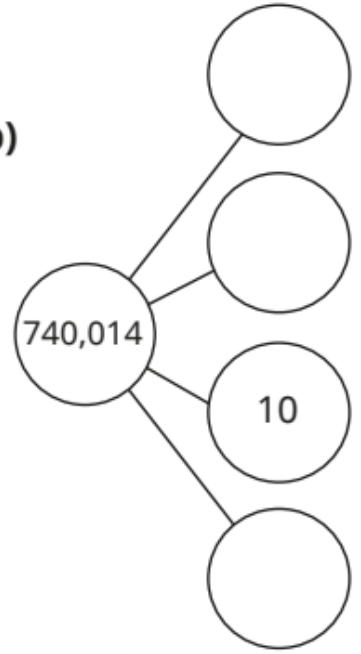


Complete the part-whole models.

a)



b)



Year 6 Numbers to 10,000,000

We have now shifted to an abstract representation but we can still use place value charts and counters to represent the number and to physically exchange between the columns.

Here is a number.

Millions	Thousands			Ones		
O	H	T	O	H	T	O
3	2	5	4	9	0	7

a) What is the number?

b) What is 400,000 greater than the number?

c) What is 20,000 less than the number?

Mathematical thinking

Here are some clues to a 7-digit number.

- There is nothing in the thousands or hundreds columns.
- The tens digit is 1 less than the millions digit.
- The ones digit is 1 less than the tens digit.
- The hundred-thousands digit is 4
- The digit sum is 15

a) What could the number be?

b) Write the number in words.

Year 6 Powers of 10

a) Show 27,000 on the Gattegno chart.

1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000
100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
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

b) Complete the sentences.

27,000 is 10 times the size of ☐

27,000 is one-tenth the size of ☐

☐ is 100 times the size of 27,000

☐ is one-hundredth the size of 27,000

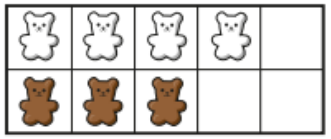
In Year 1, pupils will begin to look at addition using ten frames.

Addition – add together

White Rose MATHS

1 Complete the sentences.

a)

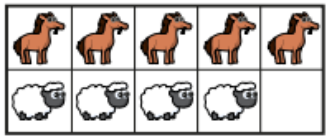


There are ☐ white bears.

There are ☐ brown bears.

There are ☐ bears altogether.

b)



There are ☐ horses.

There are ☐ sheep.

There are ☐ animals altogether.

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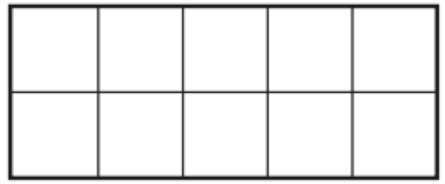
2 Draw counters to show the objects.

Complete the number sentences.

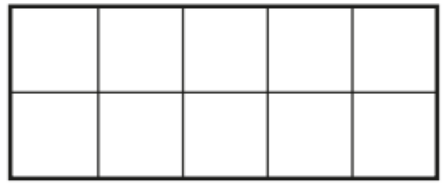
a) There are 5 yellow sweets and 2 green sweets.



How many sweets are there altogether?

☐ + ☐ = ☐

b) There is one blue car and eight red cars.



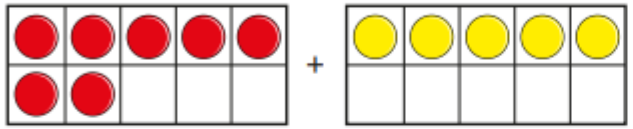
How many cars are there altogether?

☐ + ☐ = ☐

Add by making 10

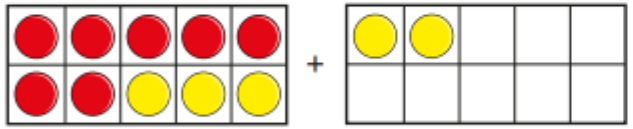
White Rose MATHS

1 **a)** What addition is shown on the ten frames?



\+ ☐ + ☐

Jo moves some counters to help her add 7 and 5



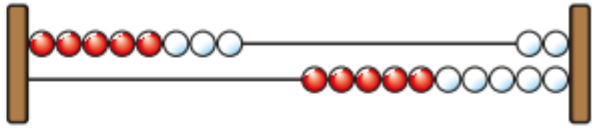
b) Complete the addition shown now.

10 + ☐

c) Complete the addition.

7 + 5 = 10 + ☐ = ☐

2 Mo uses a Rekenrek to work out 8 + 4



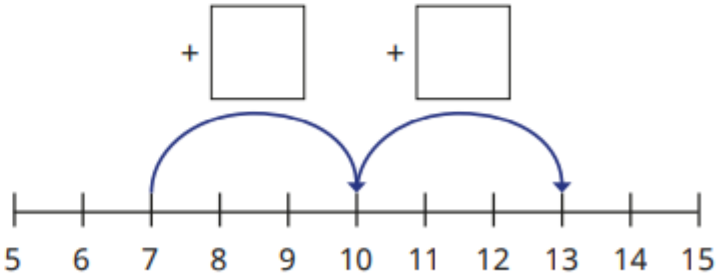
How many does Mo need to push to get to 10? ☐

How many more does Mo need to push to find the answer? ☐

What is 8 + 4? ☐

3 Sam uses a number line to work out 7 + 6

Complete Sam's workings.



7 + 6 = ☐

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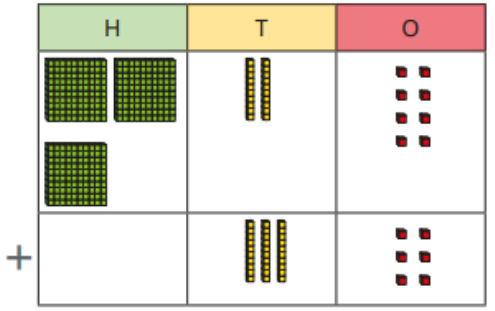
In Year 2, pupils begin to look at a variation of methods to represent adding – looking at crossing the boundary of ten.

Add 2-digit and 3-digit numbers

White Rose MATHS

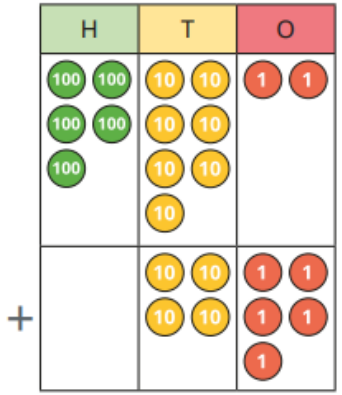
1 Use the place value chart to work out 328 + 36



		3	2	8	
	+		3	6	

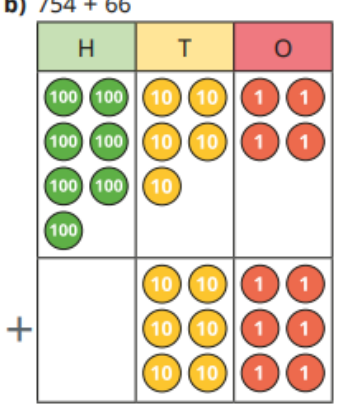
2 Work out the additions.

a) 572 + 45



		5	7	2	
	+		4	5	

b) 754 + 66



		7	5	4	
	+		6	6	

3 Work out the additions.

a)

		1	7	5	
	+		7	2	

b)

		3	0	7	
	+		8	4	

c) 35 kg + 239 kg

d) 845 + 72

e) 436 + 85

f) £739 + £68

In Year 3, pupils begin to look at more formal methods for addition alongside the pictorial representation. This is where we use the vocabulary 'exchanging' when we have more than 9 in a column.

Add two 4-digit numbers – more than one exchange

White Rose MATHS

1 Complete the calculation.

Th	H	T	O
1,000 1,000	100	10 10 10 10 10	1 1 1 1 1 1
+ 1,000 1,000 1,000	100 100 100 100	10 10 10 10	1 1 1 1 1 1 1 1

		Th	H	T	O	
		2	1	7	6	
	+	3	4	5	8	

2 Who has got each question correct? Tick your answer.

a) Nijah

		H	T	O	
		4	4	5	
	+	3	4	8	
		78	1	3	

Scott

		H	T	O	
		4	4	5	
	+	3	4	8	
		7	9	3	
			1		

b) Nijah

		Th	H	T	O	
		4	8	2	6	
	+		1	7	8	
		5	0	0	4	
		1	1	1		

Scott

		Th	H	T	O	
		4	8	2	6	
	+	1	7	8		
		6	6	0	6	
		1	1			

What mistake has the other person made in each calculation?

Talk about it with a partner.

3 Work out the additions.

a)

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

b)

		Th	H	T	O	
		6	0	7	5	
	+		9	4	8	

c) 3,784 + 2,526

d) 79 + 654 + 1,312

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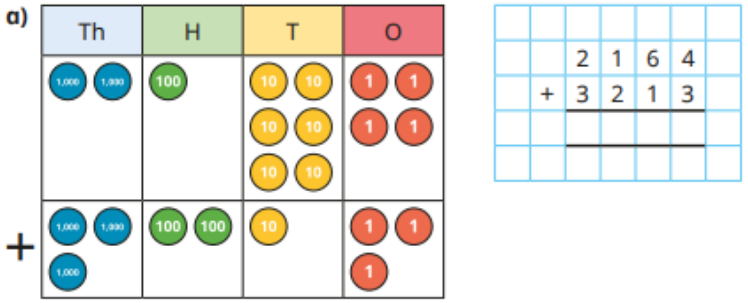
In Year 4, pupils continue to develop their understanding of formal methods alongside pictorial representations to allow pupils to understand the maths behind what they are doing.

Add whole numbers with more than four digits

White Rose MATHS

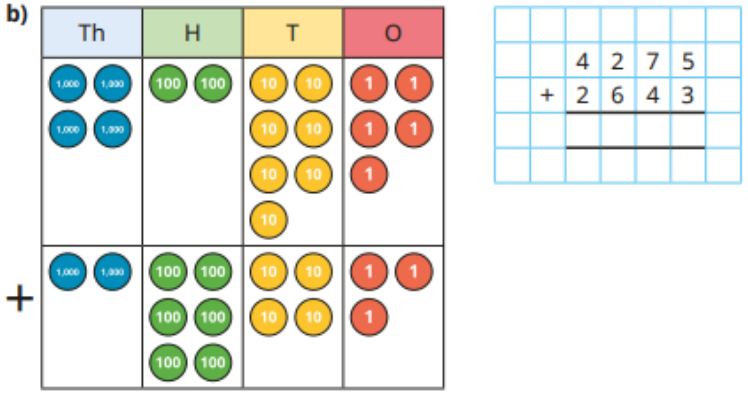
1 Complete the calculations.

a)



	2	1	6	4
+	3	2	1	3

b)



	4	2	7	5
+	2	6	4	3

2 Complete the column additions.

	7	4	3	5
+	2	4	5	6

	7	4	3	5
+	2	4	6	6

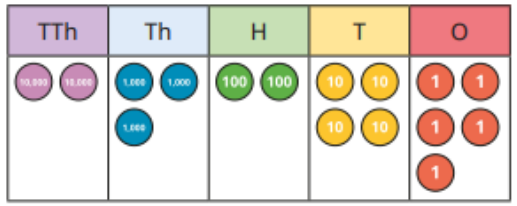
	7	4	3	5
+	2	5	6	6

	7	4	3	5
+	3	5	6	6

What do you notice about each addition?

What stays the same? What changes?

3 Complete the additions. Use the place value chart to help you.



a) 23,245 + 14,323 = ☐

b) 23,245 + 14,328 = ☐

c) 23,245 + 14,846 = ☐

d) ☐ + 23,245 = 35,490

In Year 5, pupils continue to develop their understanding and move quickly on to formal methods where there will be more that one exchange.

Add and subtract integers

White Rose MATHS

1 Complete the calculations.

a)

		3	0	5	9	4
	+	1	5	4	2	3

b)

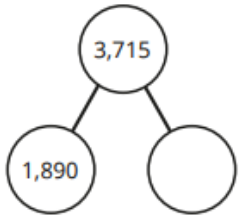
		4	2	4	8	5	0
	−			5	2	3	6

c) 5,236 + 424,850

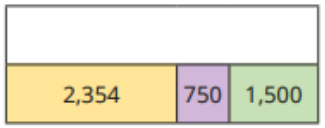
d) 30,594 − 15,423

2 Calculate the missing numbers. Show your method.

a)



b)



c) 23,500 + ☐ + 120,578 = 1,201,079

d) ☐ − 233,233 = 322,322

3 Match the calculations to the best estimates.

8,000,500 − 6,100,000	200,000
1,250,000 + 900,000	one million
double 600,000	$2\frac{1}{4}$ million
123,999 + 84,178	2 million

Compare answers with a partner.

4 Fill in the missing numbers.

a)

		8	1		8	5
	+			0	6	
		9	9	5		8

b)

		2			5	5
	−	2		0	5	
			9	0		5

c)

		8		4	8	5	
	−	3	6				4
			5	5	5	5	5

d)

	2	1		8	5	
+			0	6		
	4	1	0		2	

In Year 6, pupils move quickly on to formal methods, including setting out the sums themselves. They are to then look at identifying the answers for different representations.

On the White Rose Maths website, there are free booklets that you can download and print off. These are for Years 1 to 6 and there is a booklet for each unit within each year group. You can also download them off Amazon to print off or download on to a Kindle.

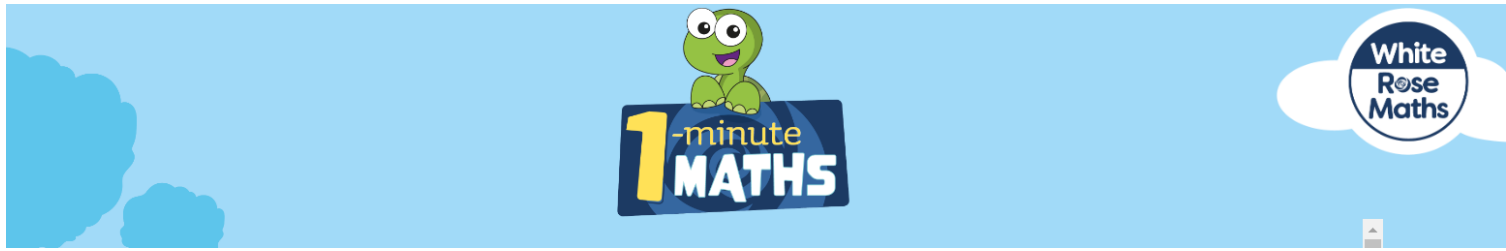
https://whiterosemaths.com/parent-resources

https://www.amazon.co.uk/s?i=digital-text&rh=p_27%3AWhite+Rose+Maths&stext=White+Rose+Maths

Finchale Primary School

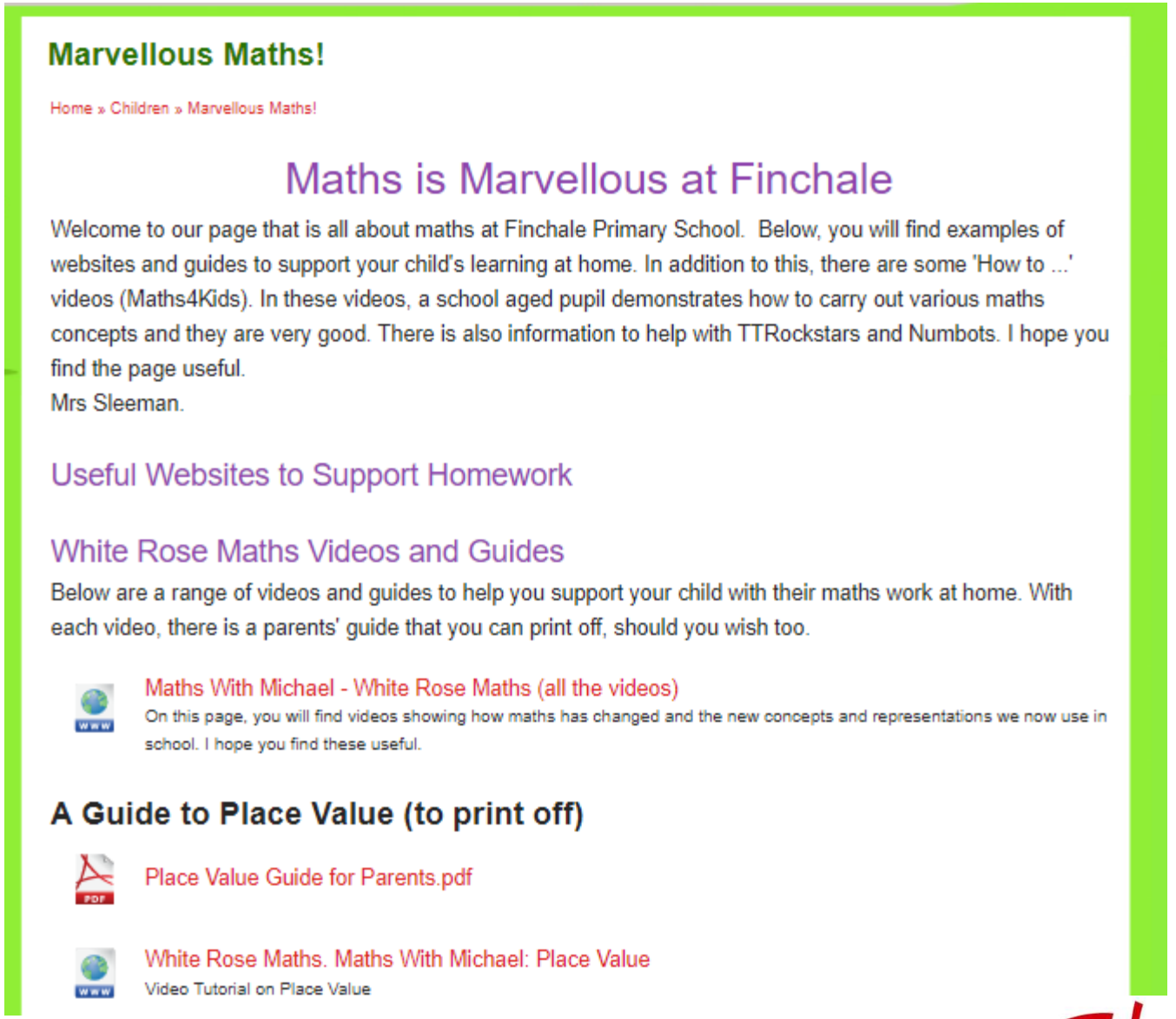
Also, on the White Rose Maths website, there are videos and parents' guides for some of the units of maths. These videos show and explain what we cover and some of the methods we use. The guides also show how to use the resources and give examples of these for you to print off. https://whiteroseeducation.com/parent-pupil-resources/maths/maths-with-michael

Another great aspect to the White Rose Maths website is 1 minute maths. This is a free app that you can download from the Amazon Store, Google Play Store or the Apple App Store.



Finchale Primary School

Please do visit our ‘Maths is Marvellous’ page on our school website. You will find this under ‘Children’ then ‘Marvellous Maths’. On here, you will find links to the resources and websites that I have referred to during this presentation. There are also links to other websites including some ‘How to…’ videos to explain how to carry out various mathematical concepts.



Marvellous Maths!

Home » Children » Marvellous Maths!

Maths is Marvellous at Finchale

Welcome to our page that is all about maths at Finchale Primary School. Below, you will find examples of websites and guides to support your child's learning at home. In addition to this, there are some 'How to ...' videos (Maths4Kids). In these videos, a school aged pupil demonstrates how to carry out various maths concepts and they are very good. There is also information to help with TTRockstars and Numbots. I hope you find the page useful.
Mrs Sleeman.

Useful Websites to Support Homework

White Rose Maths Videos and Guides

Below are a range of videos and guides to help you support your child with their maths work at home. With each video, there is a parents' guide that you can print off, should you wish too.

Maths With Michael - White Rose Maths (all the videos)
On this page, you will find videos showing how maths has changed and the new concepts and representations we now use in school. I hope you find these useful.

A Guide to Place Value (to print off)

Place Value Guide for Parents.pdf

White Rose Maths. Maths With Michael: Place Value
Video Tutorial on Place Value

To further support learning at home, our Key Stage 2 pupils have access to Times Table Rockstars and our pupils in Years 1 and 2 will be starting Numbots.

Many thanks for listening.