EARLY MATHS DEVELOPMENT AT ISH

12.01.2023

KATIE HEALY – EYFS LEAD & RUBY VAN DER MEULEN – MATHS LEAD

OVERVIEW

- Early number sense
- Question time
- Maths Mastery – what is it, why and how do we teach it?
- Maths progression at ISH
- What can you do at home?
- Question time

EYFS

- What number sense is (and isn't!)
- Why our children need to develop strong number sense and use these skills

apple

Imagine you have this in your hand.
What do you think of?
What do you feel?
What do you associate this with?
What words instantly come to mind?
Write them down!

You may have thought of this:

Or this:

Which is interesting, as I never said the word apple.

When reading the word 'apple', your brain instantly made associations with this word, and the words you will have written down will be your own representations of apples.

apple

The same applies to number.

Here is the digit **4**

But this is not all that 4 is. 4 has several different representations.

This is what we explore with our children in Group 1.

4 is more than the digit. 4 can be:

2 and 2
1 and 3
1 and 1 and 1 and 1
How many blueberries I have left in my snack box
How many friends I have
The number of conkers that I found on my way home
The leaves on a clover
The buttons on my coat
….

WHAT IS NUMBER SENSE?

- Number sense is a concept that explains a child's ability to both understand and use numbers in practice.

Misconceptions:
Number sense is the ability to...

- write numbers
- count sequentially (rote counting)

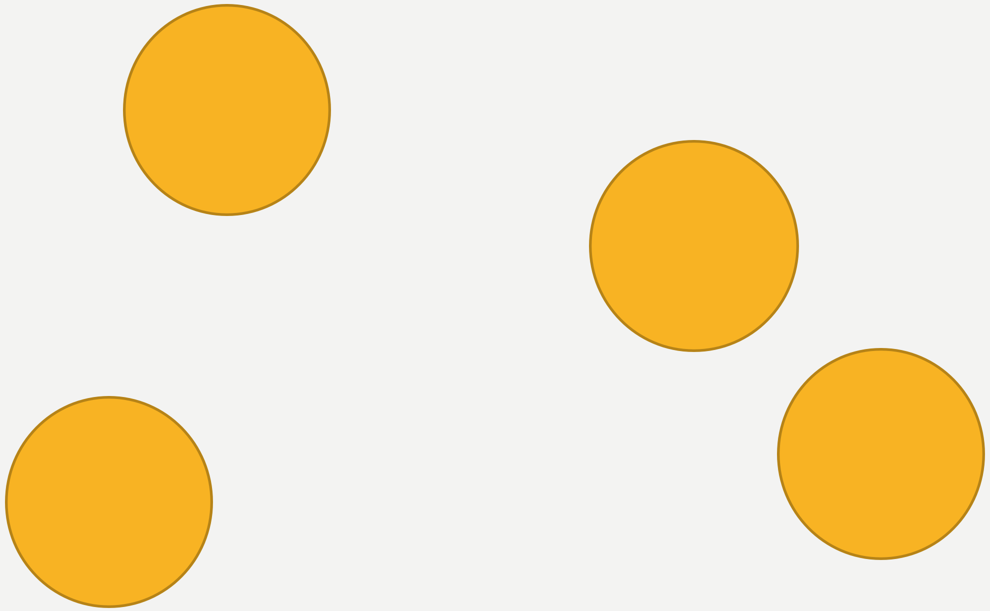
'I am 4'! (but 4 what?)

'There's the number 3 bus! But where's the number 1 and 2 bus?'

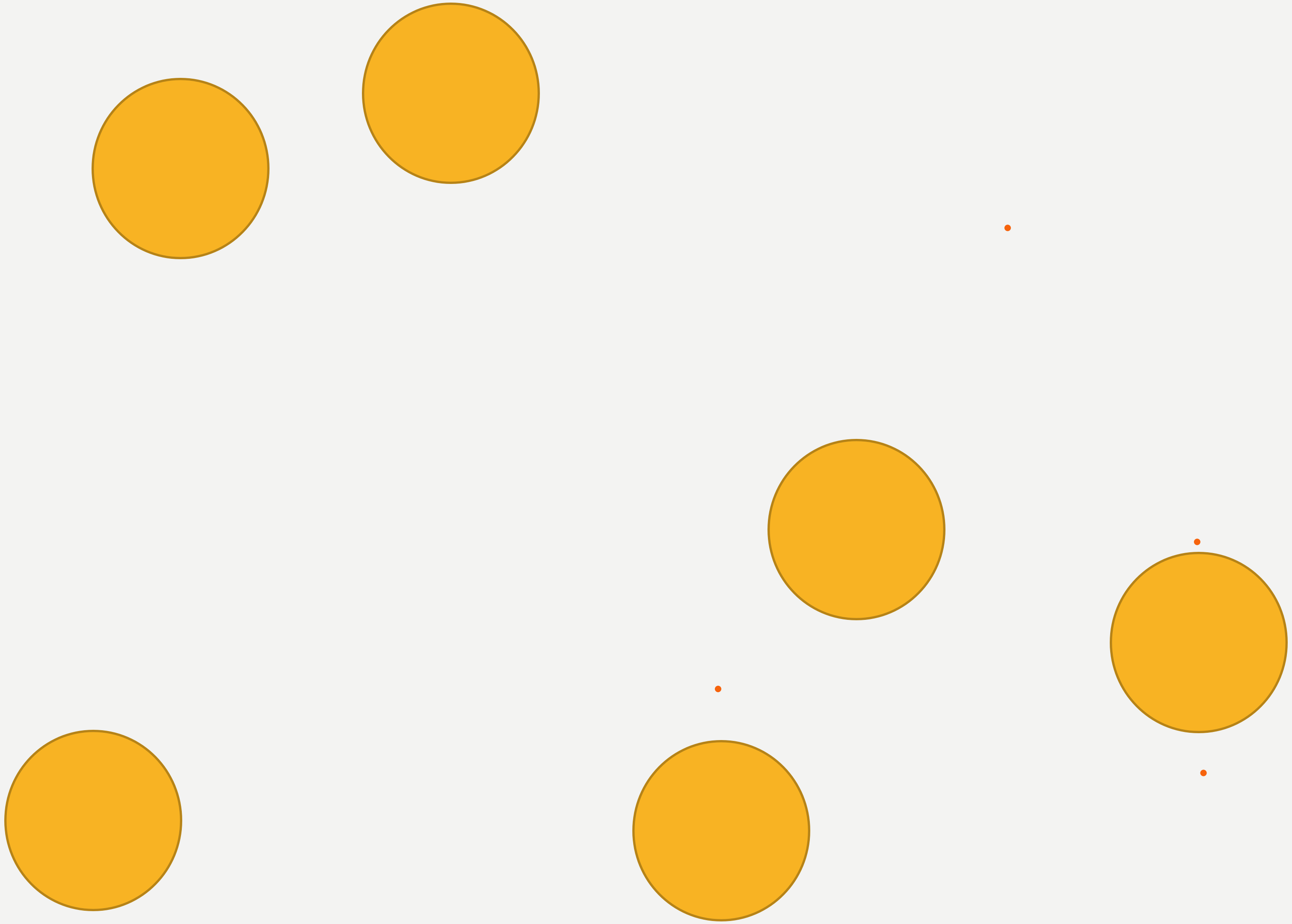
Numbers aren't just digits. We need to think about what they are representing.

Skills in number sense

Noticing



What can you see?
Where can you see these representations?



What can you see?
Where can you see these representations?

Why is noticing important?

This helps children to see number as more than just the digit.

Children begin to see and understand that numbers can be represented in different ways.

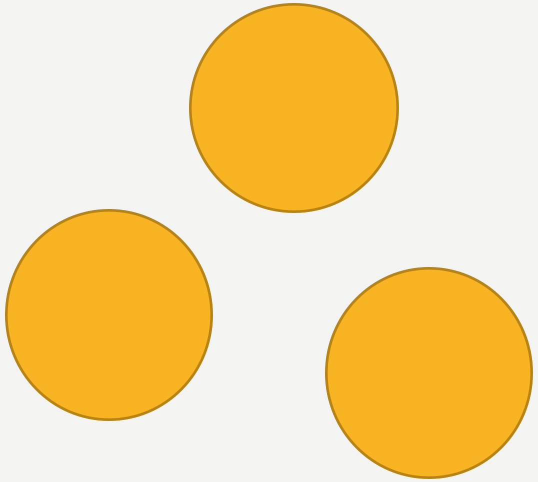
They begin to see that numbers can be made up of other numbers.

Anno's Counting book – great resource for noticing different representations of numbers!
The children in Group 1 LOVE finding visual representations of numbers in images!

Subitising

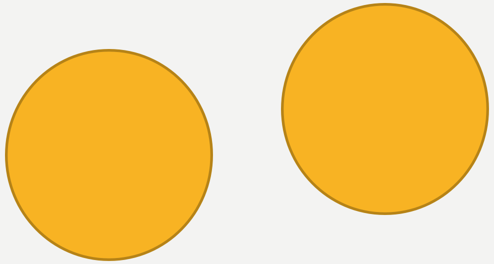
Recognising instantly the amount of something without counting.

It happens from birth!
When children begin to see 2 eyes and a mouth.



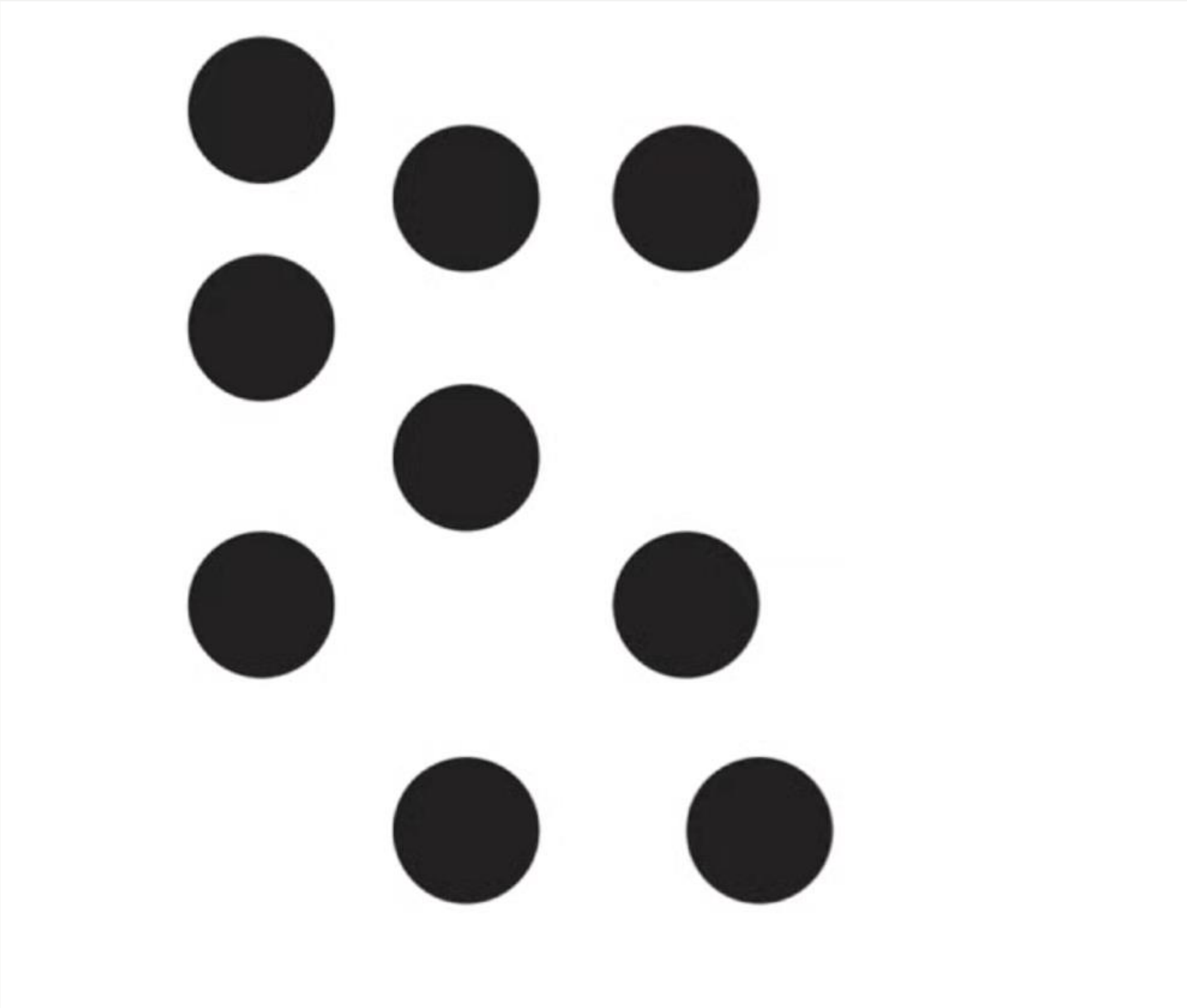
We have learned to call this amount 3

We can still see there are more here than there are below, without needing a number name for them.

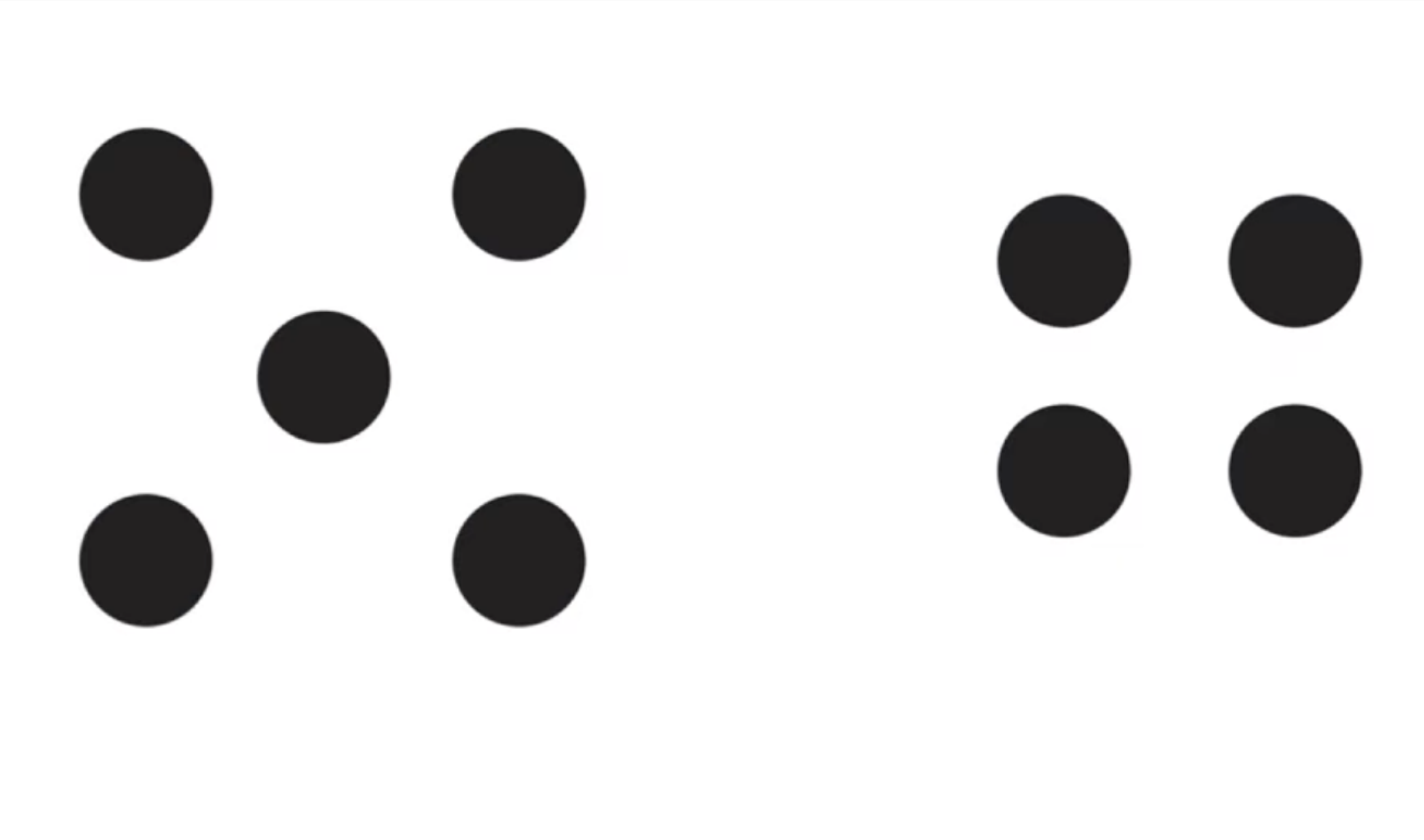


We have learned to call this amount 2

HOW MANY DOTS CAN YOU SEE?



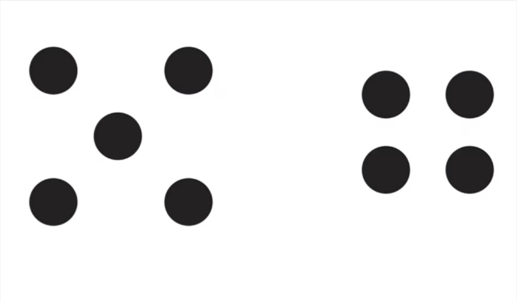
HOW MANY DOTS DID YOU SEE?

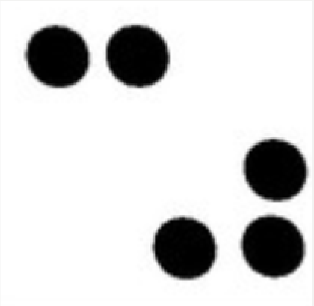


This is easier.

This is the same number of dots, arranged in a different way.
You have conceptually subitised those numbers using your number sense and you have calculated that there are 9 dots.

Why is subitising important?





- To conceptually subitise as we did, children need to really see the ***pattern in number.***
- To do this, we explore perceptual subitising – exploring subitising with items of 5 or less.

Counting principles

- Children from a young age are fascinated and curious about numbers.
- They count for ***ordinality*** – the idea that numbers come in order. When they count initially, it is not to find out how many, as this is too complex.
- Counting for ordinality is when children learn number names and the rules of counting in order, knowing that we say: 1, 2, 3, 4, 5

How can we help support children with counting for ordinality?

- Songs, action rhymes, stories with number sequences.

Counting principles

Counting for ***cardinality*** – using number to find out how many.

There is a big jump between counting for ordinality to counting for cardinality.

A misconception children might have is that by naming each individual item as '1', '2' '3' and so on, they can't distinguish yet between the individual car number and the total amount. So, when you ask, 'how many cars are there?' sometimes children will count again.

We might be saying 'there are 5 cars', but children might be thinking:

'you said there's 5, but that's 2. It's not 5!'

1 2 3 4 5

This is useful in helping to identify if counting makes sense to children.

Counting for ***cardinality***

How do we help with misconceptions?

Revisit subitising.

Add 1 more at a time, then subitise.

Emphasise that you are saying the word one each time (and not labelling each item as 1,2,3,4,5)

Let's add another 1

Let's add another 1

Let's add another 1

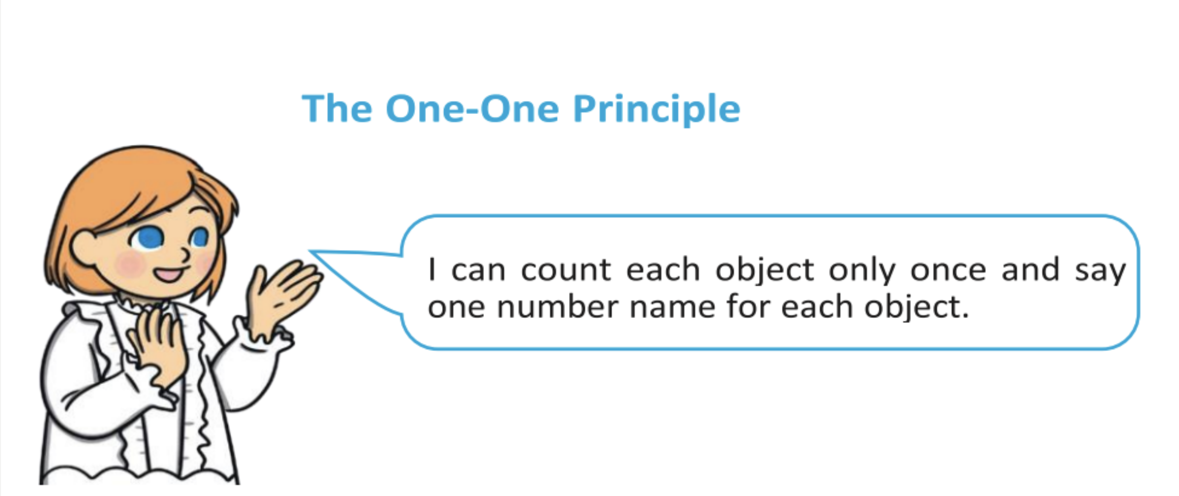
Let's add another 1

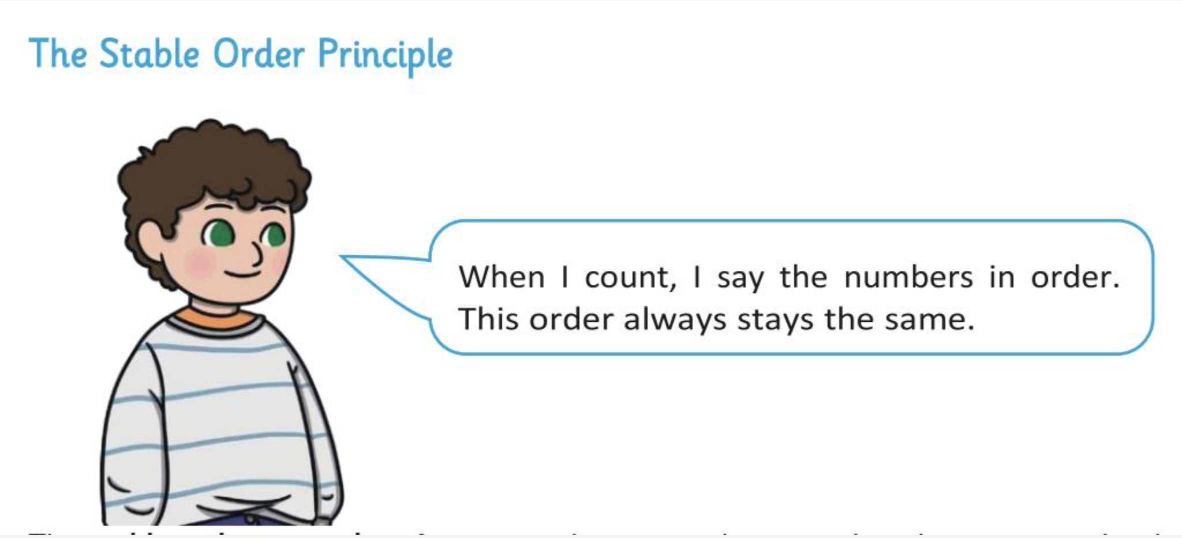
Why is this important?

- Being able to know the total amount of something, and spotting patterns within it, will hugely help children when they learn to add, subtract, multiply, divide, use fractions when they are older.

<u>5 Counting Principles</u>

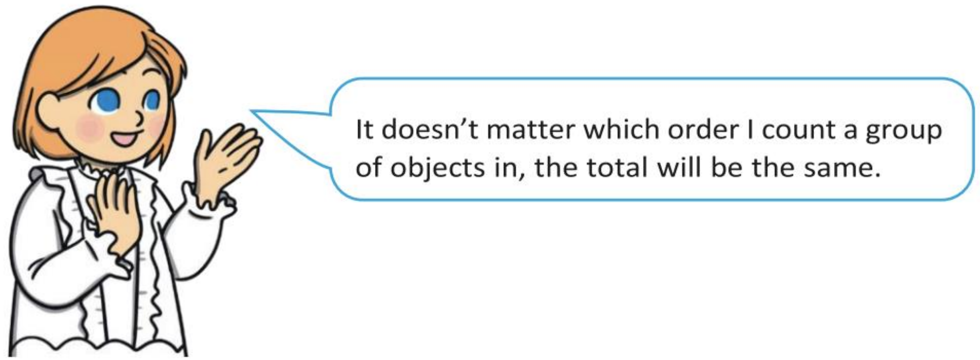
These are all underpinned by subitising



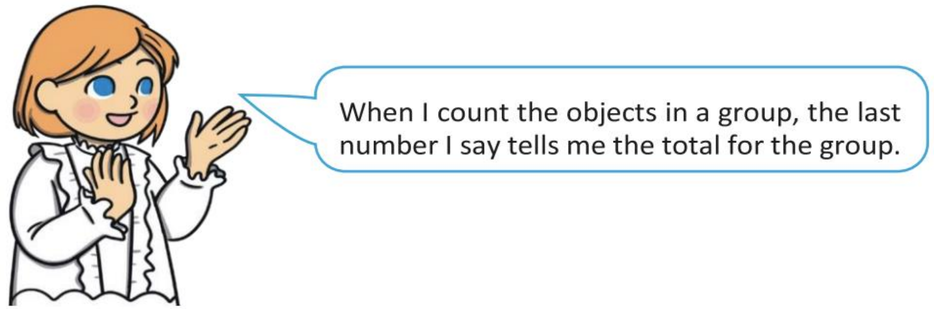


Skim and flurry. This happens when children have not yet learnt to count systematically.

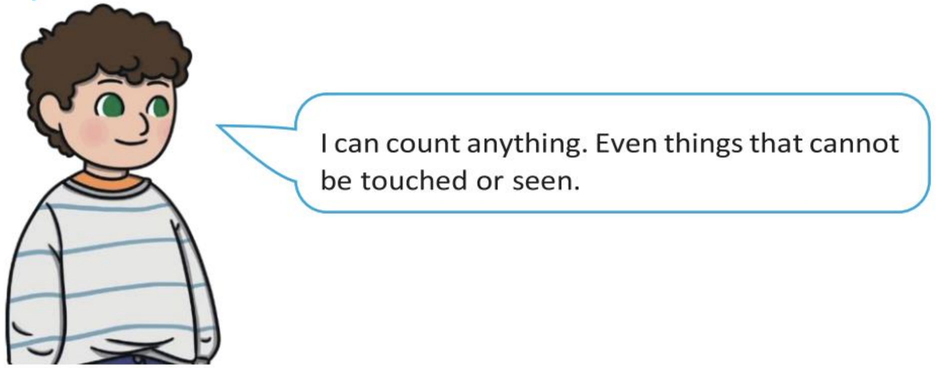
The Order-Irrelevance Principle



The Cardinal Principle



The Abstraction Principle



Why do children need to develop number sense?

- In Group 1, we spend a lot of time focusing on exploring 1 – 10, and we begin to explore numbers to 20 later in the year.
- Children might be able to count beyond 10, but it is crucial that children understand what these numbers mean.

The numbers highlighted do not verbally articulate the actual number physically represented in them. Whilst 14,16,17, 18 and 19 do.

This can be confusing!

It's important that children know what these numbers mean.

Why do children need to develop number sense?

- It is ***crucial*** to develop a deep understanding of number: patterns in number and how numbers can be represented.
- In Group 1, we spend a lot of time exploring numbers 0 – 10.
- Why? Because our whole number system is designed around the number 10. Exploring these numbers and what they mean in depth in Group 1, provides children with a deep understanding of number that prepares them for future Maths learning in later years.

QUESTION TIME!

If you're leaving now, please fill in the questionnaire to help us improve our workshops!

MATHS AT ISH

STARTER QUESTION

WHICH ONE IS EASIER? WHY?

3 + 8 + 7 =

OR

6 + 3 + 9 =

RUBY VAN DER MEULEN – MATHS LEAD

OVERVIEW

- Maths Mastery – what is it, why and how do we teach it?
- Maths progression at ISH
- What can you do at home?
- Question time

MATHS MASTERY – WHAT IS IT?

STARTER QUESTION:

WHICH ONE IS EASIER? WHY?

A) 3 + 8 + 7 =

OR

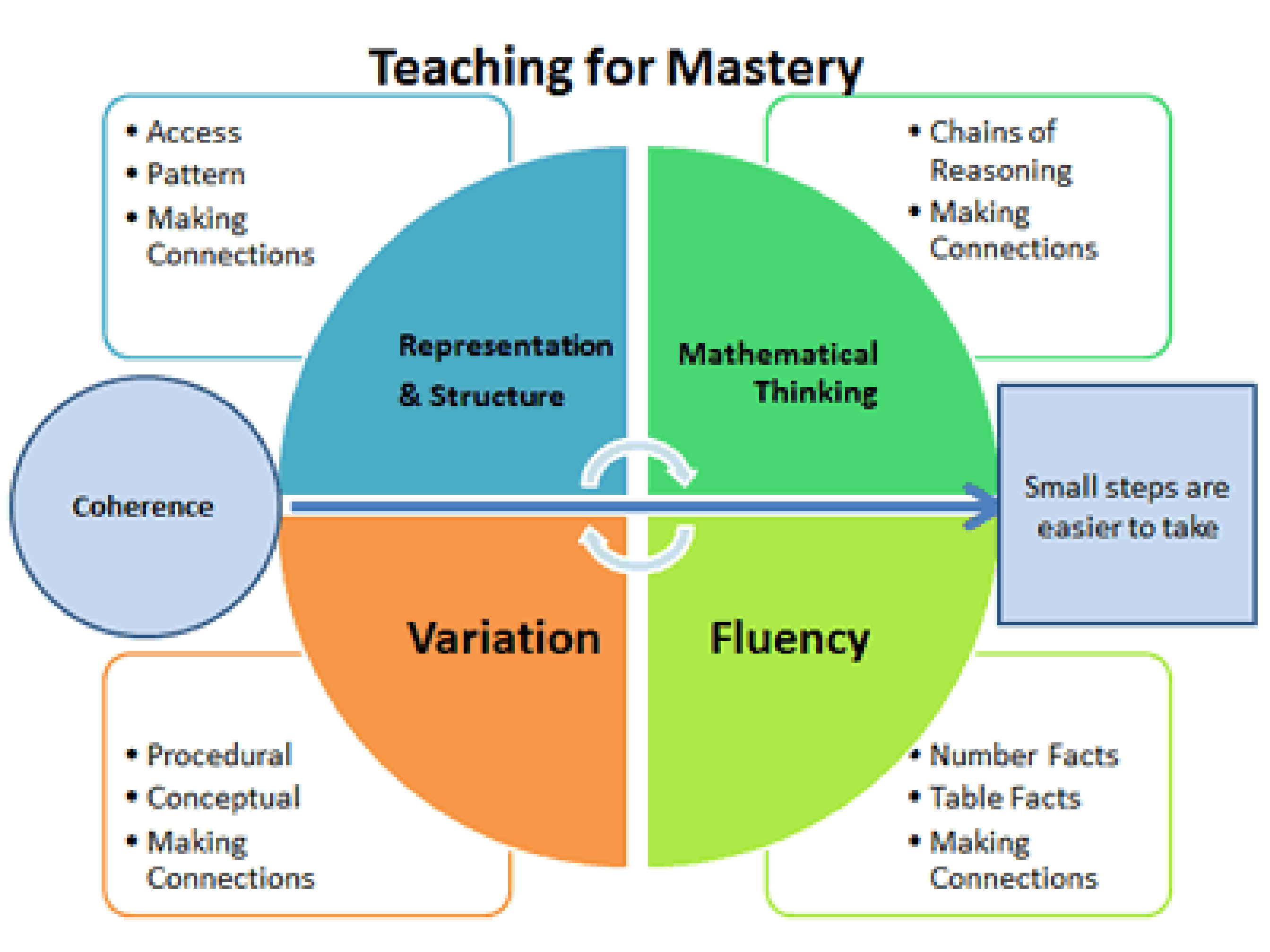
B) 6 + 3 + 9 =

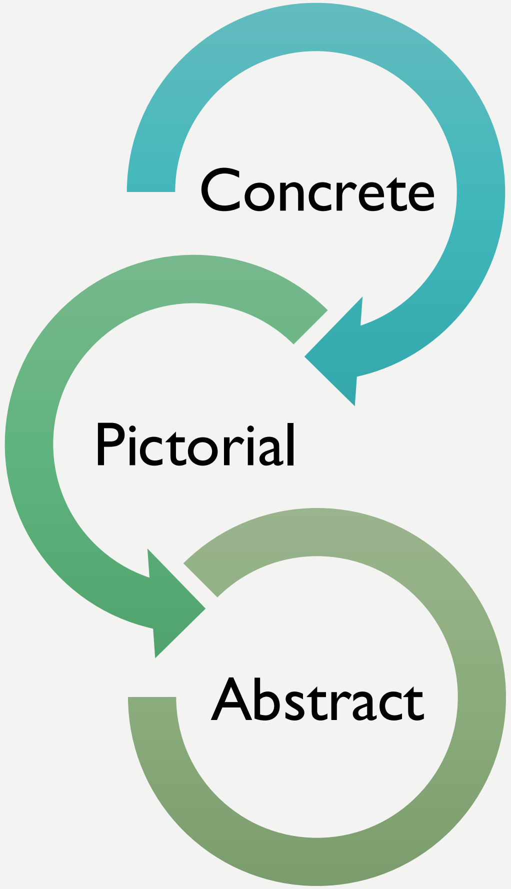
connections

patterns

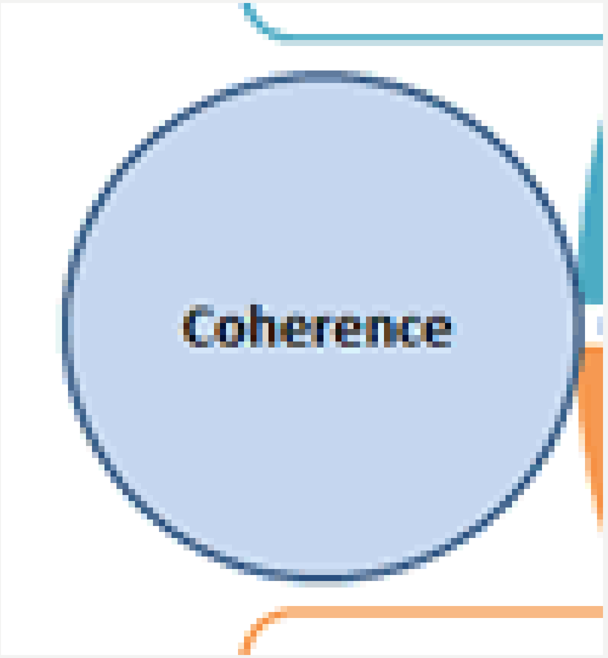
deeper understanding

MATHS MASTERY – WHAT IS IT?

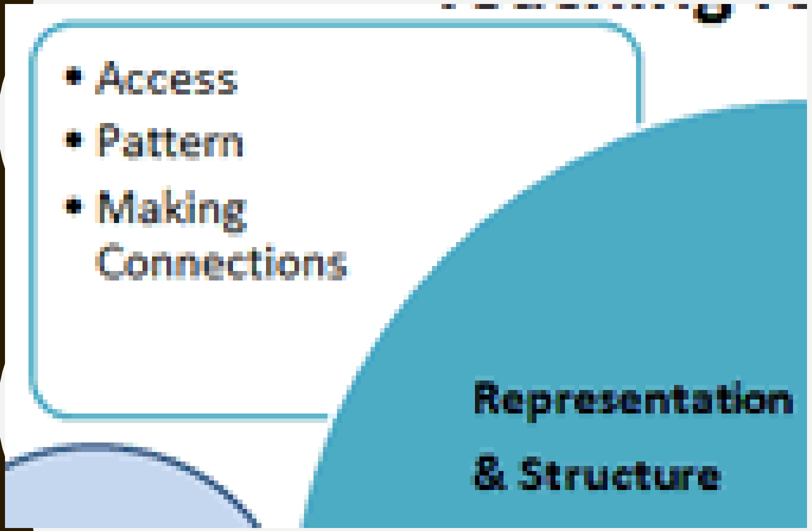




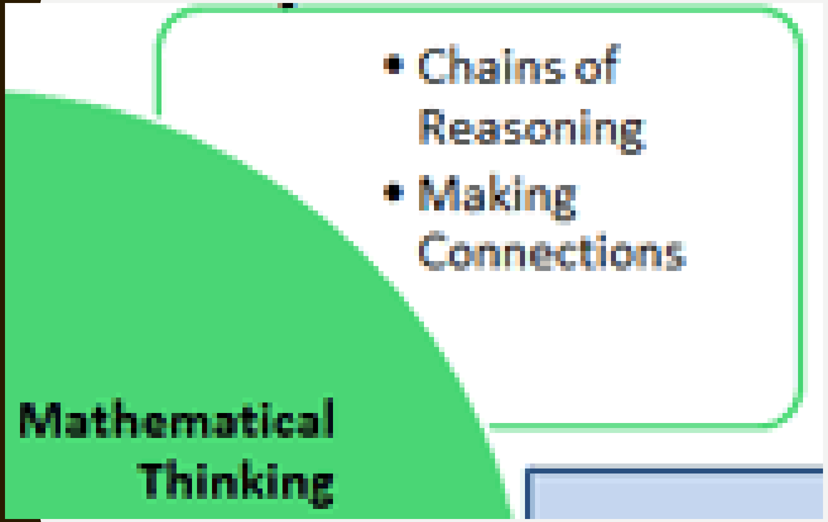
Source: Five Big Ideas in Teaching for Mastery, NCETM



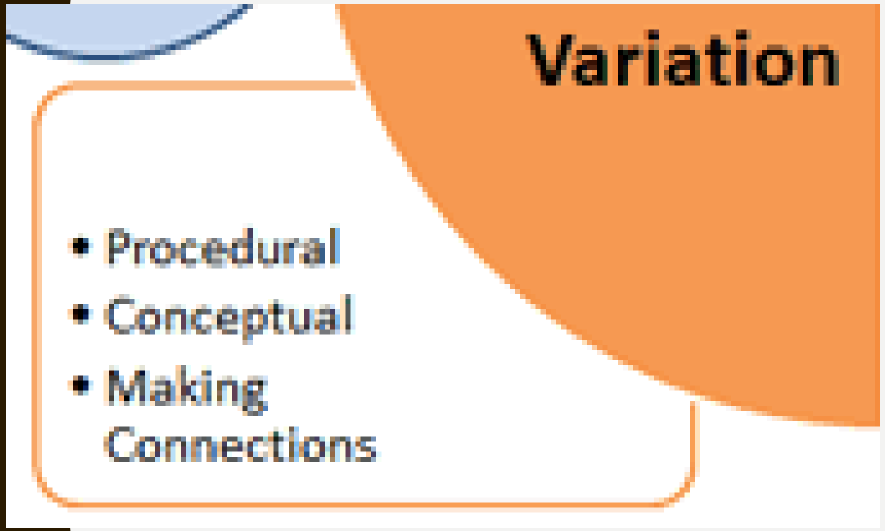
- Small steps
- Sequence
- Key learning point
- Prior knowledge



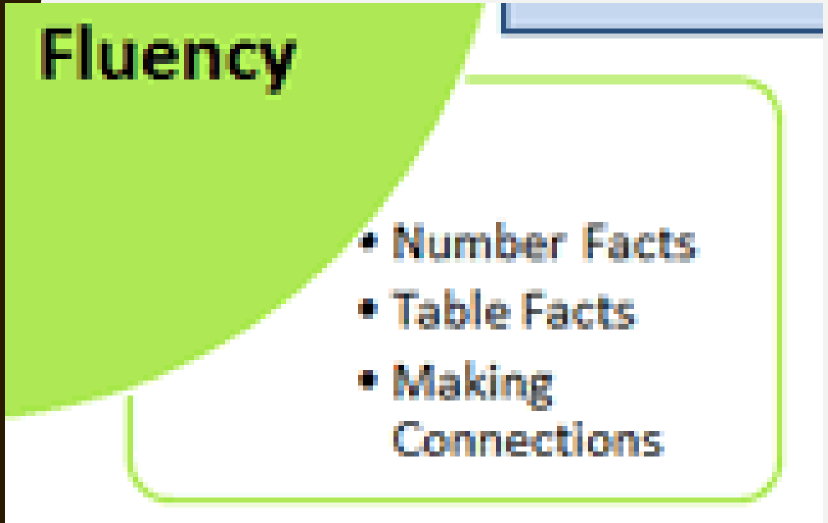
- Expose structure
- Difficulty point
- Expose patterns



- Depth
- Reason & discuss
- Spotting patterns & connections
- Conjectures



- Essential features
- Examples/non-examples
- Standard/non-standard
- Intelligent practise



- Efficient
- Accurate
- Flexible
- Quick recall

MATHS MASTERY – WHY DO WE TEACH IT?

- Actual understanding versus tricks
- Confidence – everybody can!
- Real world thinking / problem solving

MATHS MASTERY – HOW DO WE TEACH IT?

A maths mastery lesson includes:

- Teacher input (actively engaged with by children)
- Independent, pair, or group practise
- Challenge

not necessarily in that order!

MATHS PROGRESSION AT ISH

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value (within 10)					Number: Addition and subtraction (within 10)					Geometry: Shape	Consolidation
Spring	Number: Place value (within 20)			Number: Addition and subtraction (within 20)			Number: Place value (within 50)		Measurement: Length and height		Measurement: Mass and volume	
Summer	Number: Multiplication and division			Number: Fractions		Geometry: Position and direction	Number: Place value (within 100)		Measurement: Money	Measurement: Time		Consolidation

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value				Number: Addition and subtraction					Geometry: Shape		
Spring	Measurement: Money		Number: Multiplication and division					Measurement: Length and height		Measurement: Mass, capacity and temperature		
Summer	Number: Fractions			Measurement: Time			Statistics		Geometry: Position and direction		Consolidation	

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value			Number: Addition and subtraction					Number: Multiplication and division A			
Spring	Number: Multiplication and division B			Measurement: Length and perimeter			Number: Fractions A			Measurement: Mass and capacity		
Summer	Number: Fractions B		Measurement: Money		Measurement: Time			Geometry: Shape		Statistics		Consolidation

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value				Number: Addition and subtraction			Measurement: Area	Number: Multiplication and division A			Consolidation
Spring	Number: Multiplication and division B			Measurement: Length and perimeter		Number: Fractions				Number: Decimals A		
Summer	Number: Decimals B		Measurement: Money		Measurement: Time		Consolidation	Geometry: Shape		Statistics	Geometry: Position and direction	

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value			Number: Addition and subtraction		Number: Multiplication and division A			Number: Fractions A			
Spring	Number: Multiplication and division B			Number: Fractions B		Number: Decimals and percentages			Measurement: Perimeter and area		Statistics	
Summer	Geometry: Shape			Geometry: Position and direction		Number: Decimals			Number: Negative numbers	Measurement: Converting units		Measurement: Volume

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place value		Number: Addition, subtraction, multiplication and division					Number: Fractions A		Number: Fractions B		Measurement: Converting units
Spring	Ratio		Algebra		Number: Decimals		Number: Fractions, decimals and percentages		Measurement: Area, perimeter and volume		Statistics	
Summer	Geometry: Shape			Geometry: Position and direction	Themed projects, consolidation and problem solving							

MATHS PROGRESSION AT ISH

Place Value

<table>
<tr><th>National Curriculum Goals</th><th>Key Vocabulary</th><th>Representations</th><th>Concrete Resources</th></tr>
<tr>
<td>
<u>Group 2</u>
• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
• count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
• given a number, identify one more and one less
• identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
• read and write numbers from 1 to 20 in numerals and words
</td>
<td>
<u>Group 2</u>
Zero
Ones
Tens
Partition
-teen number
-ty number

Compare
Equal to / the same as (=)
Smaller / fewer / less / is less than (<)
Smallest / fewest / least
More / bigger/ larger / greater / greater than (>)
Most / biggest / largest /greatest

Before / 1 less
After / 1 more
Jump forwards
Jump backwards
Skip counting / counting by

Number
Number in words
Digit
Symbol
Represent

How many?
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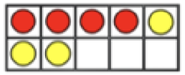
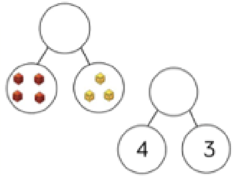
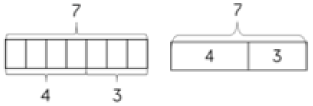
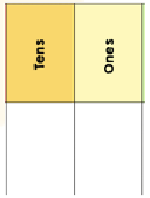
<td>
<u>Group 2</u>
Ten frames

Part-whole model


Bar model


Bead strings

Place value chart


Place value cards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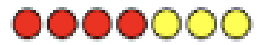
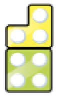
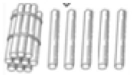
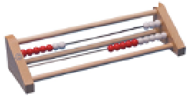
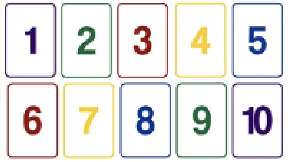
<td>
<u>Group 2</u>
Snapcubes

Counters

Numicon

Straws

Bead strings

Number lines (labelled)


Base ten

Counting rack

Flashcards with numbers


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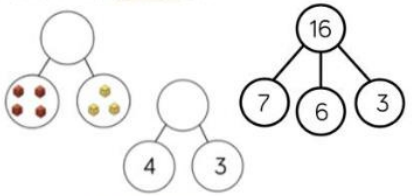
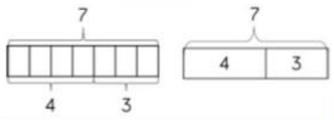
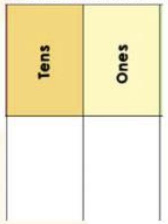
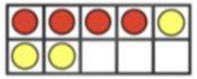
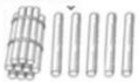
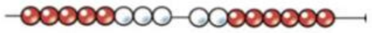
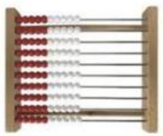
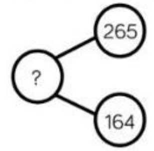
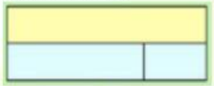
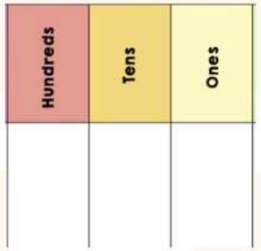
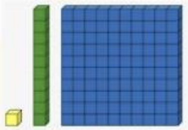
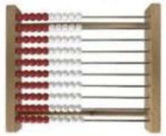
MATHS PROGRESSION AT ISH

National Curriculum Goals	Key Vocabulary	Representations	Concrete Resources
<u>Group 3</u> • count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward • recognise the place value of each digit in a two-digit number (tens, ones) • identify, represent and estimate numbers using different representations, including the number line • compare and order numbers from 0 up to 100; use and = signs • read and write numbers to at least 100 in numerals and in words • use place value and number facts to solve problems	<u>Group 3</u> *Zero* *Ones* *Tens* *Hundred* *Partition* *-teen number* *-ty number* *Place value* *Value* *Compare* *Equal to / the same as (=)* *Smaller / fewer / less / is less than (<)* *Smallest / fewest / least* *More / bigger/ larger / greater / greater than (>)* *Most / biggest / largest /greatest* *Order* Before / 1 less / 10 less After / 1 more / 10 more *Jump forwards* *Jump backwards* *Skip counting / counting by / counting in / times tables* *Number* *Amount* *Number in words* *Digit / numeral* *Symbol* *How many?*	<u>Group 3</u> **Part-whole model**  **Bar model**  **Bead strings**  **Place value chart** 	<u>Group 3</u> **Ten frames**  **Snapcubes**  **Counters**  **Numicon**  **Straws**  **Bead strings**  **Number lines (labelled)**  **Base ten** **Place value cards**  **Counting rack** 

MATHS PROGRESSION AT ISH

National Curriculum Goals	Key Vocabulary	Representations	Concrete Resources
<u>Group 4</u> • count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number • recognise the place value of each digit in a three-digit number (hundreds, tens, ones) • compare and order numbers up to 1000 • identify, represent and estimate numbers using different representations • read and write numbers up to 1000 in numerals and in words • solve number problems and practical problems involving these ideas	<u>Group 4</u> *Zero* *Ones* *Tens* *Hundreds* *Partition* *-teen number* *-ty number* *Place value* *Value* *Place holder* *Compare* *Equal to / the same as (=)* *Smaller / fewer / less / is less than (<)* *Smallest / fewest / least* *More / bigger/ larger / greater / greater than (>)* *Most / biggest / largest /greatest* *Order* *Ascending* *Descending* *Before / 1 less / 10 less / 100 less* *After / 1 more / 10 more / 100 more* *Skip counting / counting by / counting in / times tables / multiples of* *Round to the nearest 10 / 100* *Round up* *Round down* *Number* *Number in words* *Digit* *Symbol* *How many?*	<u>Group 4</u> **Part-whole model**  **Bar model**  **Place value chart** 	<u>Group 4</u> **Bead strings**  **Number lines (unlabelled)**  **Base ten**  **Place value counters**  **Counting rack**  **Snapcubes**  **Counters**  **Place value cards** 

MATHS PROGRESSION AT ISH

National Curriculum Goals

<u>Group 5</u>

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value

Key Vocabulary

<u>Group 5</u>

Zero
Ones
Tens
Hundreds
Thousands
Partition
-teen number
-ty number
Negative number
Positive number
Place value
Value
Place holder

Compare
Equal to / the same as (=)
Smaller / fewer / less / is less than (<)
Smallest / fewest / least
More / bigger/ larger / greater / greater than (>)
Most / biggest / largest /greatest
Order
Ascending
Descending

Estimate / approximate
Round to the nearest 10 / 100 / 1000

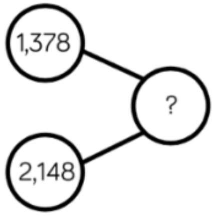
100 less / 1000 less
100 more / 1000 more
Skip counting / counting by / counting in / times tables / multiples of

Roman numerals
Digit

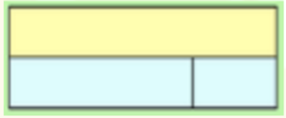
Representations

<u>Group 5</u>

Part-whole model



Bar model



Place value chart

Roman numerals poster

I	1	XX	20	CC	200
II	2	XXX	30	CCC	300
III	3	XL	40	CD	400
IV	4	L	50	D	500
V	5	LX	60	DC	600
VI	6	LXX	70	DCC	700
VII	7	LXXX	80	DCCC	800
VIII	8	XC	90	CM	900
IX	9	C	100	M	1,000
X	10	CL	150	$\bar{V}$	5,000

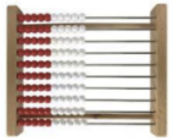
Concrete Resources

<u>Group 5</u>

Counters

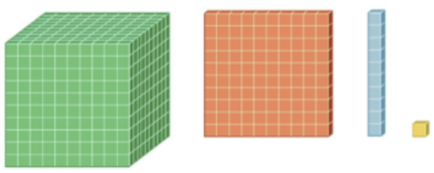
Place value counters

Counting rack



Dice

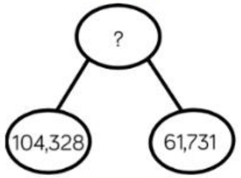
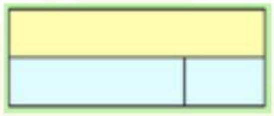
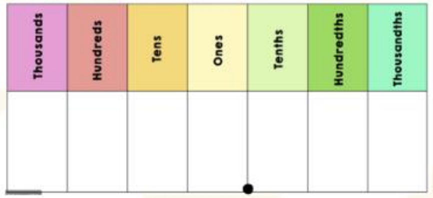
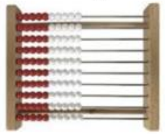
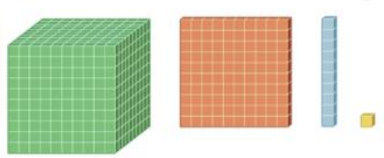
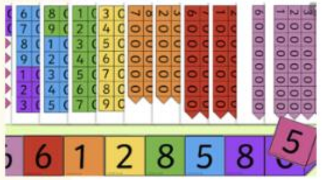
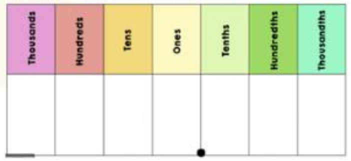
Base ten



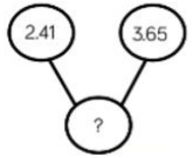
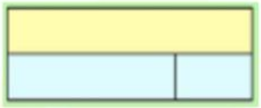
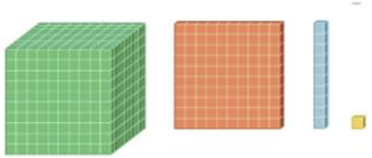
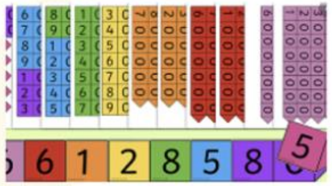
Number lines (unlabelled)

Place value cards

MATHS PROGRESSION AT ISH

National Curriculum Goals	Key Vocabulary	Representations	Concrete Resources
Group 6 • read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit • count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero • round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • solve number problems and practical problems that involve all of the above • read Roman numerals to 1000 (M) and recognise years written in Roman numerals	Group 6 *Zero* *Tenths* *Hundredths* *Thousandths* *Ones* *Tens* *Hundreds* *Thousands* *Tens of thousands* *Hundreds of thousands* *Million* *Partition* *Negative number* *Positive number* *Place value* *Value* *Place holder* *Compare* *Equal to / the same as (=)* *Smaller / fewer / less / is less than (<)* *Smallest / fewest / least* *More / bigger/ larger / greater / greater than (>)* *Most / biggest / largest /greatest* *Order* *Ascending* *Descending* *Estimate / approximate* *Round to the nearest 10 / 100 / 1000 / 10 000 / 100 000* *100 less / 1000 less / 10 000 less* *100 more / 1000 more / 10 000 more* *Skip counting / counting by / counting in / times tables / multiples of / factors / products* *Digit / Roman numerals*	Group 6 **Part-whole model**  **Bar model**  **Place value chart** 	Group 6 **Counters**  **Place value counters**  **Counting rack**  **Dice**  **Base ten**  **Number lines (unlabelled)**  **Place value cards**  **Place value chart** 

MATHS PROGRESSION AT ISH

National Curriculum Goals	Key Vocabulary	Representations	Concrete Resources
<u>Group 7</u> • read, write, order and compare numbers up to 10 000 000 and determine the value of each digit • round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across zero • solve number and practical problems that involve all of the above	<u>Group 7</u> *Zero* *Tenths* *Hundredths* *Thousandths* *Ones* *Tens* *Hundreds* *Thousands* *Tens of thousands* *Hundreds of thousands* *Millions* *Partition* *Negative number / minus number* *Positive number* *Whole number / integer* *Place value* *Value* *Place holder* *Compare* *Equal to / the same as (=)* *Smaller / fewer / less / is less than (<)* *Smallest / fewest / least* *More / bigger/ larger / greater / is greater than (>)* *Most / biggest / largest /greatest* *Order* *Ascending* *Descending* *Estimate / approximate* *Round to the nearest 10 / 100 / 1000 / 10 000 / 100 000* *100 less / 1000 less / 10 000 less* *100 more / 1000 more / 10 000 more* *Skip counting / counting by / counting in / times tables / multiples of / factors / products / intervals*	<u>Group 7</u> **Part-whole model**  **Bar model**  **Place value chart** 	<u>Group 7</u> **Counters**  **Place value counters**  **Dice**  **Base ten**  **Number lines (unlabelled)**  **Place value cards**  **Place value chart** 

PROGRESSION DOCUMENTS FOR YOUR CHILD'S YEAR GROUP ARE ON THE WEBSITE!

Maths at ISH

We also provide you with maths progression documents, these show the learning, language, and strategies the children will be taught in each year group:

Group 2

Group 3

Group 4

Group 5

Group 6

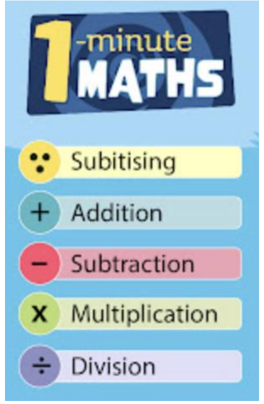
Group 7

WHAT CAN YOU DO AT HOME?

- Counting out loud

(in 1s, 10s, 5s, 2s, 3s, etc.)

- Pointing out maths in everyday life.
- Play maths games.
- Work on fluency! These apps can help:



QUESTION TIME!

Please fill in the questionnaire to help us improve our workshops!