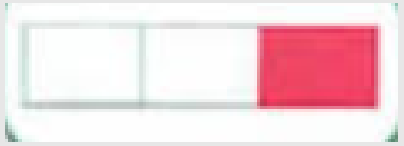
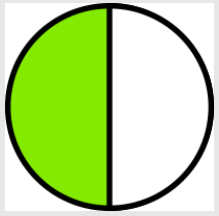
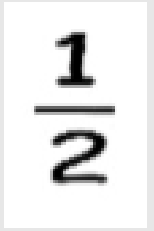
Mr Sonnex's quick home learning guide to:

Key Stage 1 Mathematics Calculation strategies

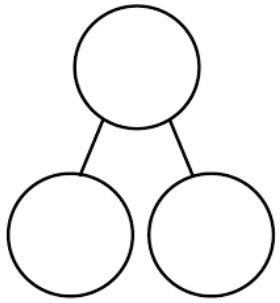
Mastery in Mathematics in Key Stage 1

We follow an approach called mastery in mathematics. The idea of mastery in mathematics is not to simply work out a calculation or problem and move on to a bigger 'harder' number. We want to really explore the calculation or problem and pull it apart to see if there are any other ways of finding the answer or solving the problem that might be more appropriate. It is also important to ask the question "How do you know?" or to tell the children to "Prove it to me!" this will encourage our children to explain and reason their answers!

We follow a simple approach to achieving mastery over any given calculation or problem:

Concrete	Pictorial	Abstract
First, we use manipulatives, physical objects to help us represent what the calculation or problem is asking.	Next, we use pictures or draw pictures to help us represent what the calculation or problem is asking.	Finally, we use numbers and symbols to represent what the calculation or problem is asking.
Addition example: *2 + 1 = ?* 		
Fractions example: 		

Parent help:
Getting stuck on a calculation or problem? Go back a step! Use Concrete objects or Pictorial representations to help! We encourage the children to do this all the time!

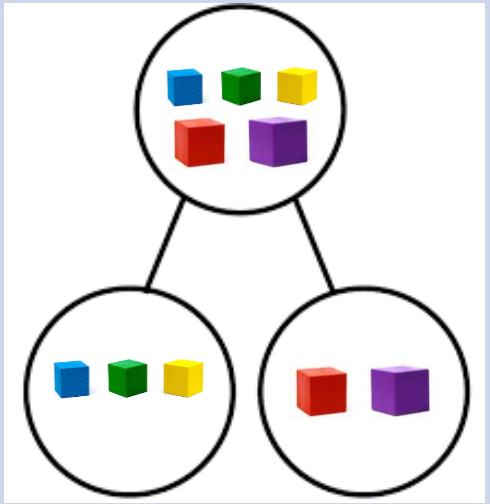
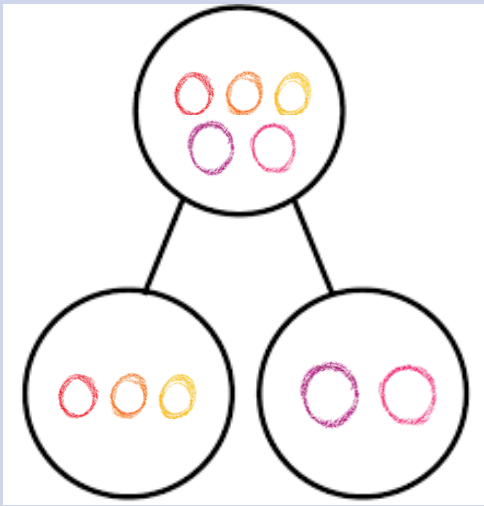
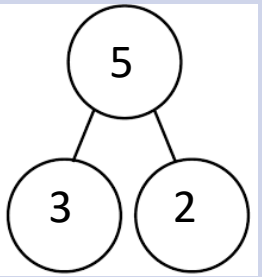


Mastery strategies

Parent help:
Lots of these strategies are usable in lots of different ways. Here are some of our most common methods!

Part- Part Whole Model

What it is used for: Part-Part Whole is a great way to represent **addition** and **subtraction**. It allows you to represent totals (the whole) and groups that make up this total (the parts).

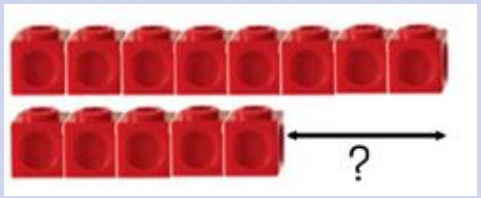
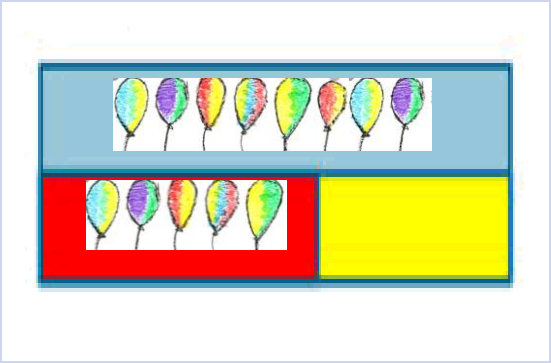
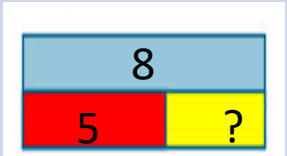
Concrete	Pictorial	Abstract
3 + 2- ? 		*Addition facts* 3 + 2 = 5 2 + 3 = 5 *Subtraction facts* 5 – 2 = 3 5 – 3 = 2 

Possible reasoning
"Five is an odd number so the parts must be unequal."

Mastery strategies

Bar Model

What it is used for: Bar Model is a great way to represent **addition** and **subtraction**. It allows you to represent totals (the whole) and groups that make up this total (the parts). Bar Model also allows you to estimate and compare based on the information that you do have.

Concrete	Pictorial	Abstract
8 - ? = 5 		*Addition facts* 5 + 3 = 8 3+ 5 = 8 *Subtraction facts* 8– 5 = 3 8 – 3 = 5 

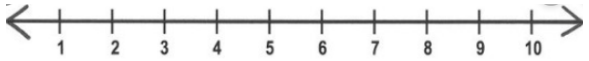
Possible reasoning

"The missing number must be three because we know the total is eight and eight take away five equals six."

Parent help:

Part-part whole model is great if you know which numbers you are working with. Bar model is even better if you are missing some numbers or are having a good educated guess!

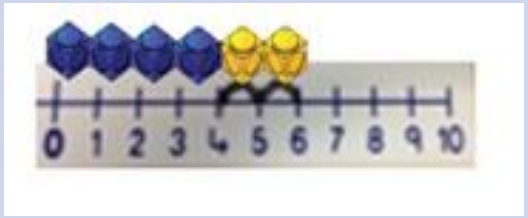
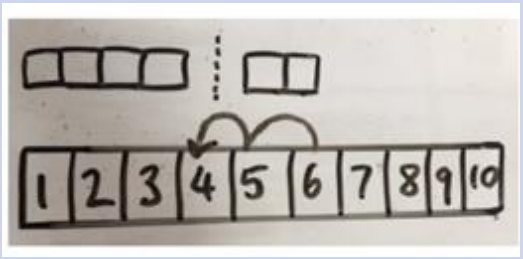
Mastery strategies



Parent help:
Bridging ten (going past a 10s number i.e. 10, 20, 30, 40, 50 etc.) can be tricky. Using a number line can really help finding where the next ten is and making that jump forwards or backwards easier!

Number lines

What it is used for: Number lines are a great way to represent **addition** and **subtraction**. It allows you to represent counting on, counting backwards and is a nice easy way to represent bridging ten (going forward or backward past a 10!).

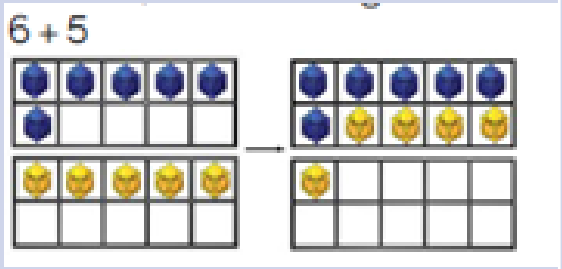
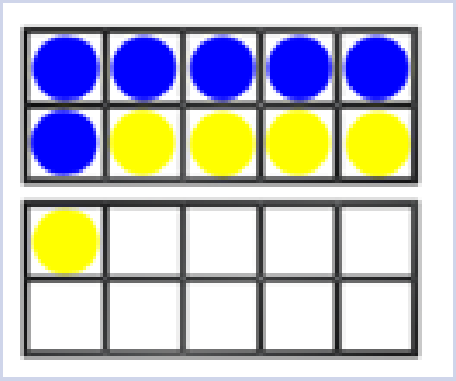
Concrete	Pictorial	Abstract
Find two less than six. 		*Addition facts* 4 + 2 = 6 2 + 4 = 6 *Subtraction facts* 6– 2 = 4 6 – 4 = 2 

Possible reasoning
"I the number I land on must be an equal number because I am starting with an equal number and taking an equal number away."

Mastery strategies

Tens frame

What it is used for: Tens frames are a great way to represent **addition** and **subtraction**. It is also another good way of bridging 10 (going past a 10s number) as it is a clear visual representation of how many was needed to get to the nearest 10.

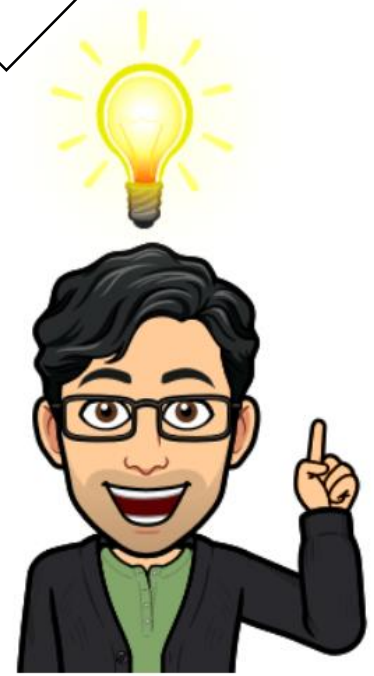
Concrete	Pictorial	Abstract
		*Addition facts* 6 + 5 = 11 5 + 6 = 11 *Subtraction facts* 11 – 6 = 5 11 – 5 = 6 *Extended using number bonds to 10* *6 + 4 = 10* *10 + 1 = 11*

Possible reasoning

"I could see that my cubes filled a tens frame so I knew I must have ten, I didn't need to count them, so I added the one in the new tens frame to make eleven"

Parent help:

Because we know there are only 10 sections in a tens frame, filling them must mean that we have 10! Any extra must be over 10! Encourage the children to recognise this and count in 10s for multiple tens frames filled.



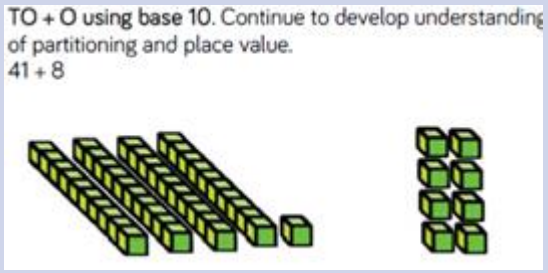
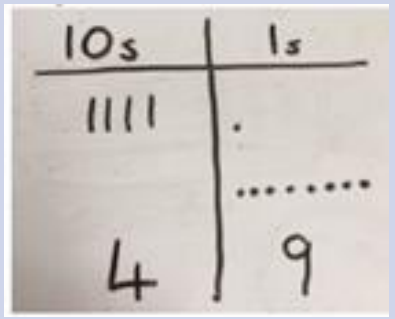
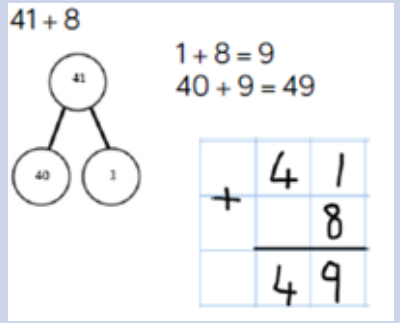
Mastery strategies

Parent help:

Many of our key stage 1 children remember the representations of a tens block or line as a 'chip' because it is long and the ones cubes or dots as 'peas' because they are small!

Tens and Ones

What it is used for: Tens and Ones are possibly the most used strategy for representing **addition , subtraction, division and multiplication** as well as a curtail part of partitioning numbers (splitting them up!).

Concrete	Pictorial	Abstract
		1 + 8 = 9 40 + 9 = 49 

Possible reasoning

" I started by adding my ones and knew I had only nine so it wouldn't change my tens number. I then added the four tens and got forty-nine"

Key questions and statements

Questions, prompts and statements to deepen thinking.

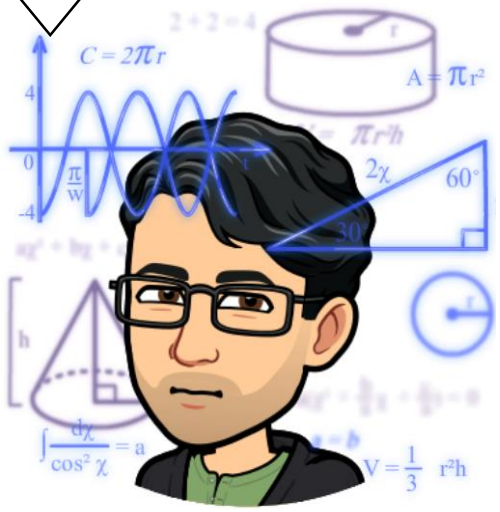
Questioning is key! Sometimes we are given answers that seem right but the children are unable to explain how they got to it or vise versa and the child seem to be using the right method but get a wrong answer. Asking children some of these questions will support their understanding!

Can you explain your reasoning?
How do you know?
Convince me....
Prove it...
Can you show me how you got to that answer?
Can you show me another way?
Can you teach me how to do that?

Children do also need support with organising their thoughts. Here are some sentence starters that often help!

I know because..... It is true/false because..... I found out that ....
If ..... is true then .... must/must not be true because.... We could also do it this way...

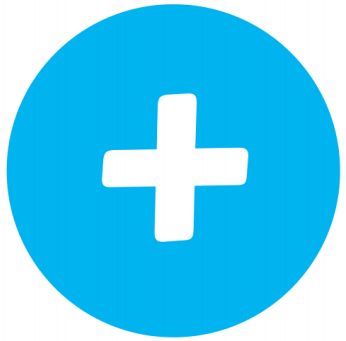
Parent help:
"But I just know it?" ... **'just knowing' an answer is often not enough to achieve age appropriate expectations, even at key stage 1. Knowing and understanding how to get to the answer opens the opportunity for the children to use their learnt skills in a range of situations and become more fluent when deciding which method to use.**



Calculation vocabulary

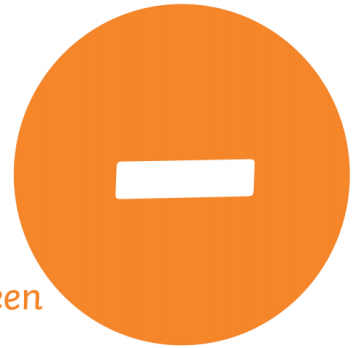
addition

- add
- more
- plus
- sum
- total
- altogether



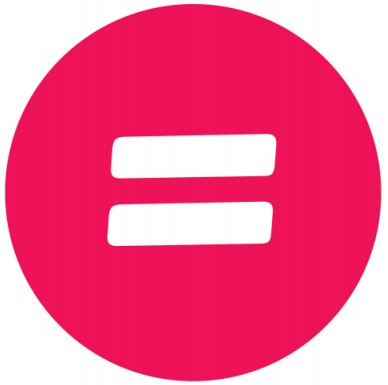
subtraction

- subtract
- minus
- leave
- less
- take away
- difference between



equals

- makes
- total
- same as
- equivalent
- balances



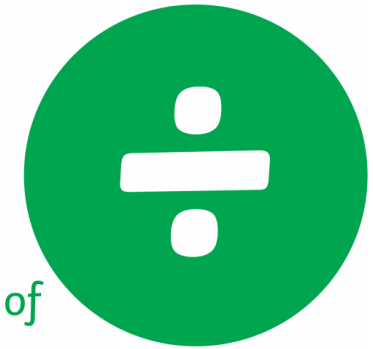
Here is some vocabulary that we use all the time in KS1.
***Note that '=' does NOT simply mean 'the answer' it is a symbol that represents total or the same as.**

multiplication

- lots of
- times
- multiply
- groups of
- product
- multiplied by
- multiple of
- repeated addition
- array

division

- divide
- divided by
- divided into
- share
- share equally
- equal groups of



Watch this space for some more quick Key stage 1 guides to help out at home!