Key Stage One Calculation Policy

Below are some examples of written and mental methods that we use at Broadway when we calculate. Children are introduced and challenged to new methods when appropriate.

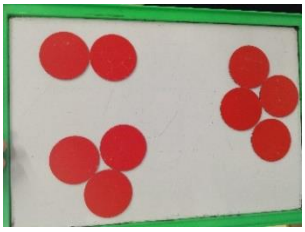
Our main focus is to guide children to develop their number sense – a deep understanding of numbers and their relationship to other numbers.

Subitising

Strong mental images are vital for children to be able to calculate! The relationships between these operations are taught together so the children develop an understanding of how they relate to each other.

Building on the subitising skills and number sense about numbers to 10 learned in Reception, children subitise real items, dots and tens frames patterns. They are asked "What do you see? How do you see it? Can you see it in another way?"

They are encouraged to talk about the patterns they see and reason about and justify their thinking. For example, a teacher might show these images:

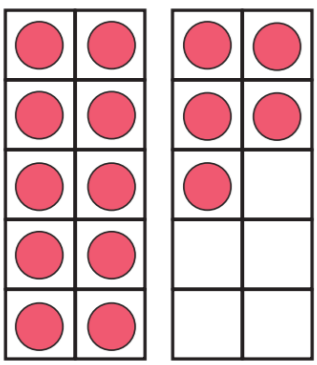


A child might say "I can see 9. I know there are 9 because I see a 2 and a 3 and that's 5 and 4 more is 9.

"I can see 12. There are 2 groups of 6. Double 6 is 12"

"I can see 2 groups of 4 so that's 8 and 4 more is 12."

" I see 5 red and 4 blue and 1 more, that's 10. And 2 more green is 12.



"I can see one finished group of 10 and 5 of the next ten. That's 15."

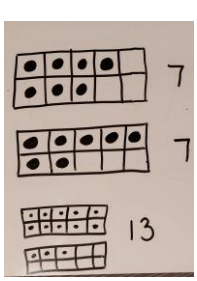
"I can see 3 groups of 5. That's 15."

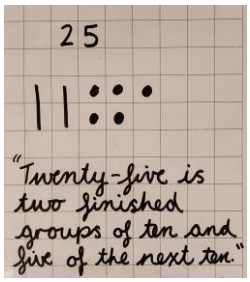
" I can see there are 5 more until we have 2 finished groups of ten (20)."

" I can see this is 5 less than 20."

"I can see that this is an odd number because you can't divide it into 2 equal parts.

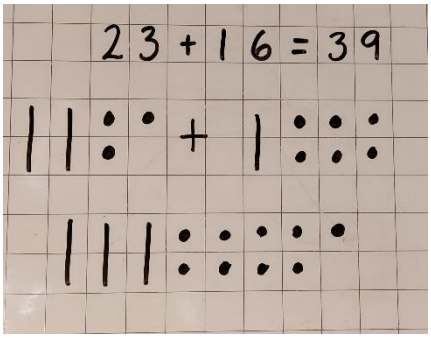
Addition



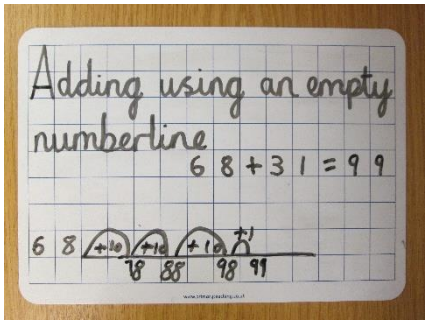


As we begin to develop our number sense, we record numbers pictorially in tens frames. When we have a solid understanding of what 2-digit numbers represent, we are ready to pictorially represent the tens and ones in a number by drawing sticks and dots.

When adding a single digit number to a two digit number, we put the largest number in our head and put our fingers up to show the amount we are adding. We then count on using our fingers, putting our fingers down as we go.

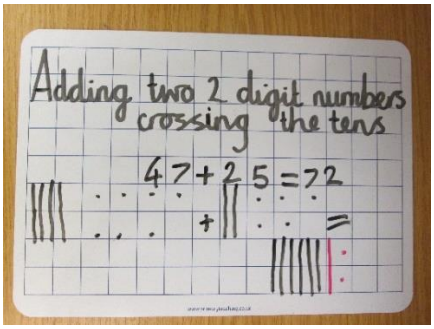


When adding two 2-digit numbers we draw the tens sticks and ones. We then re-draw the tens and the ones then write the numeral.



Addition using an empty numberline

We can also add using an empty number line. We start with the largest number and add the other number by partitioning (breaking) the number down into tens and ones.

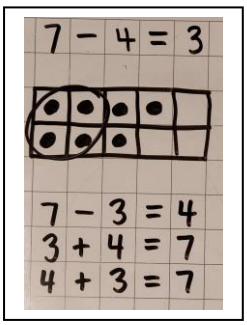


Bridging/crossing the tens boundary- This term is used when numbers bridges/crosses over a multiple of ten (10, 20, 30 40 etc...) For example, 29+3=32 this calculation jumps over 30.

When doing these types of calculations in our heads or in writing, we are encourage to make the next ten using part of the single digit number then add on the rest.

When there are more than ten ones, we group them together into a ten then re-draw and write the numeral. We 'exchange' or

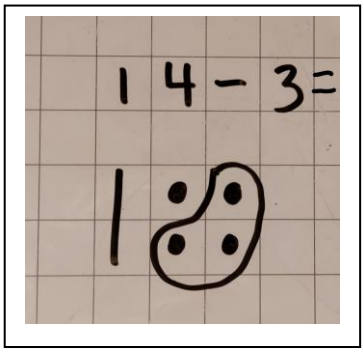
Subtraction



We begin to record our subtraction problems by drawing dots for the biggest number and then take away the smaller number.

We draw dots in tens frames to help us.

We also learn to write the number sentences for a number family to show how addition and subtraction are related.

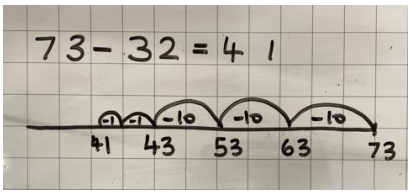


When subtracting (taking away) a single digit number from a 2-digit number, we are encouraged to use our number sense to 'see' the number and use our number facts to solve problems. For example, when solving 14 -3 we think of the numbers in tens and ones. We remember the pattern for 4 and what it would look like if we took away 3. We can see that we have 11 left.

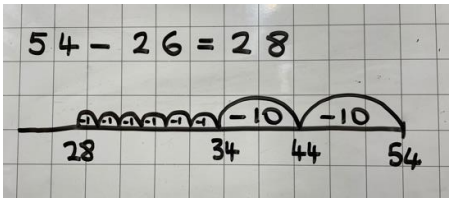
Children will later use their number facts of the numbers within 20 to solve subtraction problems.

If 4-3 = 1 then 14-3 = 11.

When subtracting (taking away) a single digit number, we can also put the biggest number in our head and put our fingers up to show the amount we are taking away. We then count back putting our fingers down as we go.

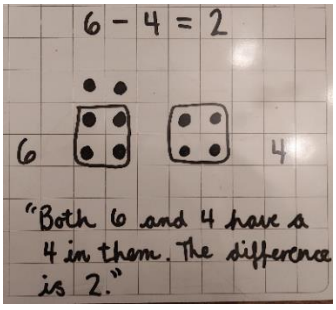


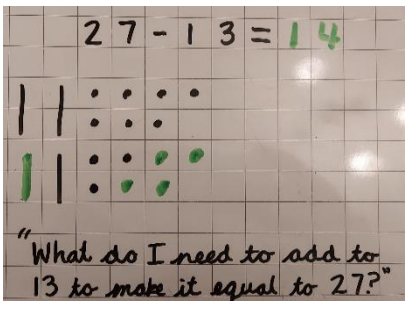
When subtracting two 2-digit numbers we use an empty number line. We put the largest number at the end of the number line and then take away the other number by taking away the tens first and then the ones. We are encouraged to jump back to the next ten by partitioning the ones into numbers that will make the calculation more efficient.



Bridging/crossing the tens boundary- This term is used when numbers bridge/crosses over a multiple of ten (10, 20, 30 40 etc...) For example, 24-7=17 this calculation jumps back through 20.

We are encouraged to partition the number that we are taking away into tens and ones. We draw a number line with the larger number at the right. We then jumps back in tens and write the numbers as we go. When we subtract the ones we partition them so we can take away to the next multiple of ten. Then we take away the rest. Our solid number sense allows us to do this efficiently.

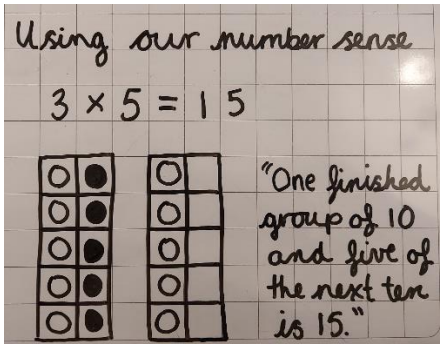




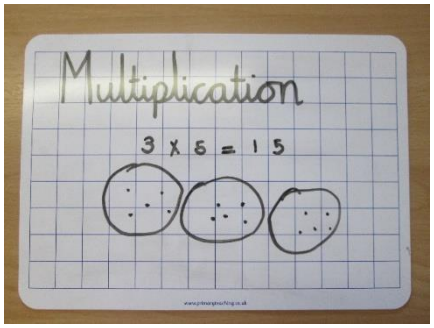
Finding the difference is also subtraction. We can find the difference by first looking at what is the same. The difference is what is not the same.

We can also think of finding the difference as finding what we need to add to the smaller number to make it equal to the larger number.

Multiplication



When multiplying, for example 3 x 5 = , we first try to 'see' what three equal groups of five would be. We use our number sense to remember what a groups of 5 looks like on a tens frame. We know that a ten has 2 fives and one more group of five would be one finished group of ten and 5 of the next ten. That's 15.

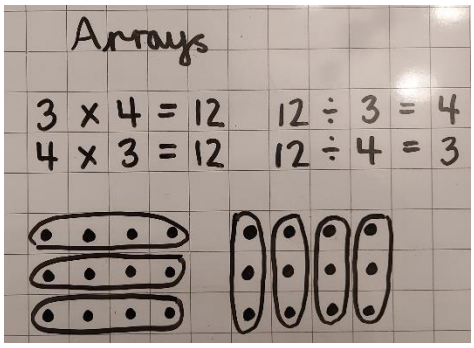


We can also draw the amount of groups and then put the amount to multiply in each group. We can then count in groups.

For example, 5, 10, 15

We can multiply using our fingers. We put our fingers up to represent the amount of groups and then count.

e.g. 3x5= put three fingers up and count in fives: 5, 10, 15 to find the total.

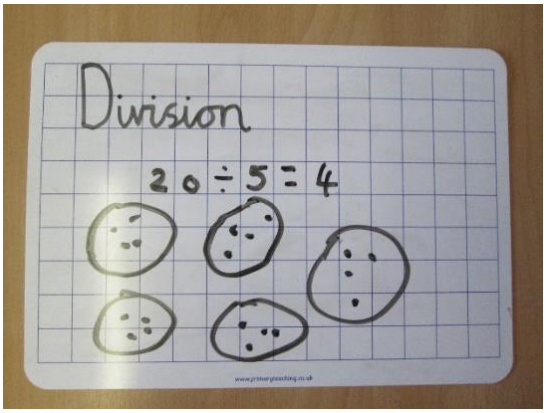


We are encouraged to see the relationship between multiplication and division. We use arrays to give us a clearer understanding of this relationship.

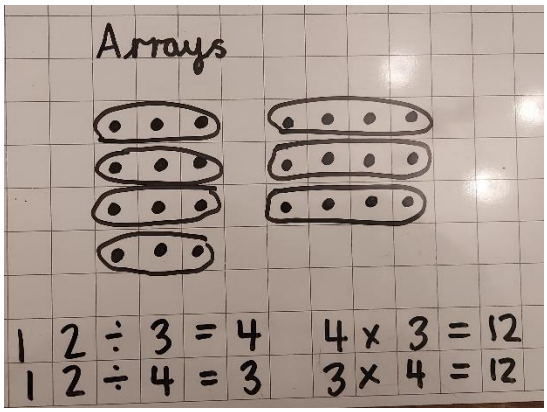
When using arrays to multiply, we arrange dots into rows and columns. We also note the division facts in the number family.

We might say "12 has 3 **equal groups** of 4." and "4 **equal groups** of 3 is 12."

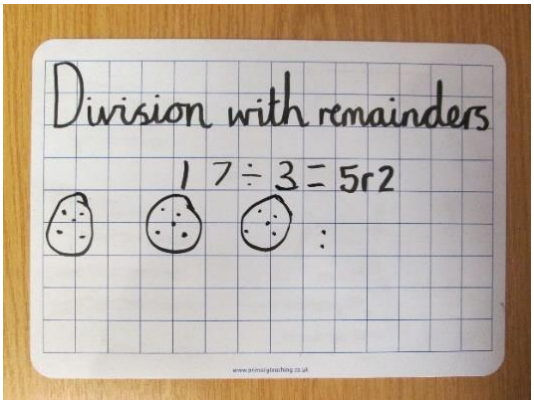
Division



When can also divide by drawing groups (circles) to show how many we are dividing by. We then share the first number between the groups one at a time. We make sure there is an equal amount in each group.

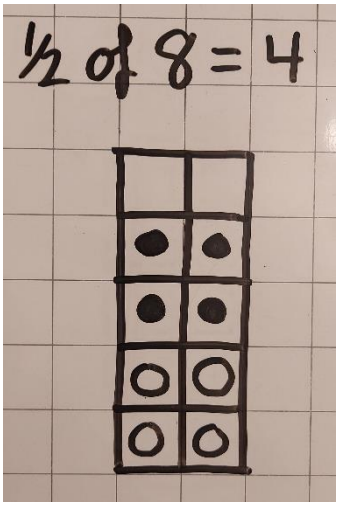


We can also think about what the number looks like in an array. For example, we would see 12 as 3 equal groups of 4 and 4 equal groups of 3. Because we understand what the number 12 is and how multiplication and division are linked, we are able to solve problems more efficiently.



Sometimes the number does not divide equally. We then need to work out the remainders.

Fractions



We can think of finding fractions as division. It is also related to multiplication.

When we are finding the fraction of a number we can use our number sense by thinking of the whole number and its equal parts. We use the term **"equal parts of a whole"**

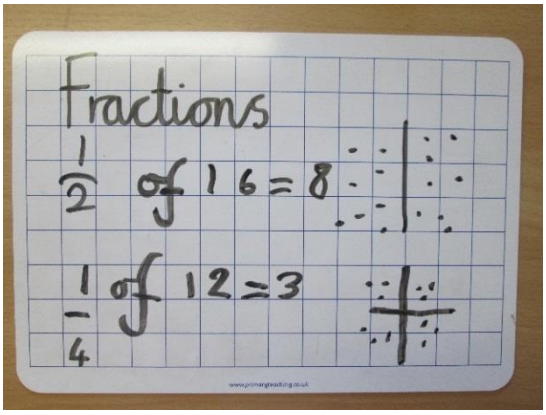
For example, when finding $\frac{1}{2}$ of 8 we want to find out the 2 equal parts that make up 8. We want one of those equal parts. So we think of 8 on a tens frame. We can easily 'see' that there are 2 equal groups of 4 in 8.

We can also think of fractions as dividing by the number on the bottom.

We are encouraged to use our number facts and what we know about the relationship between multiplication and division to help us solve and reason about these problems.

For example, $\frac{1}{4}$ of 20 is the same as 20 ÷ 4. I know there are 4 equal groups of 5 in 20 so $\frac{1}{4}$ of 20 is 5.

We also begin to see the relationships between $\frac{1}{2}$ and $\frac{1}{4}$. $\frac{1}{4}$ is half then half again. So $\frac{1}{4}$ of 20 is the same as $\frac{1}{2}$ of 20 which is 10, then half again which is 5.



We can work out fractions of numbers by sharing (dividing) the number into equal groups and then we count the required parts.

Top Tips

The best way to help your child at home is to work on developing their number sense (how a number is made up of other numbers **and** their relationship to other numbers) for numbers to 20. They can then use this understanding to solve more complicated problems.

Children learn that addition can be done in any order and multiplication can also be done in any order. For example, 8+2=10 and 2+8=10 or 3x5=15 and 5x3=15

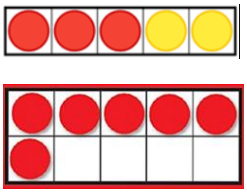
It is important that children understand that calculations are related to one another and can use this knowledge to solve calculation problems. For example

6+4=10 4+6=10 10-6=4 and 10-4=6

10=6+4 10=4+6 6=10-4 and 4=10-6

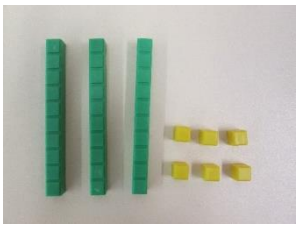
Resources

Using maths equipment really helps children to solve calculations and to see the visual representation before recording. Below are some examples of some fantastic resources we use to support calculation.

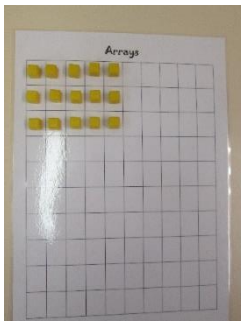


Fives and tens frames with counters

Cubes



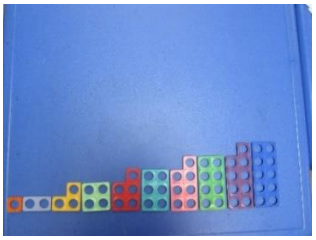
Dienes (tens and ones)



Arrays

Bead strings

Coins



Numicon

There are plenty of resources you could use at home to help with maths such as buttons, pasta, pennies, fruit- anything!