

Whole School Calculation Policy 2023-2024



مدرسة جيمس متروبول
GEMS Metropole School
MOTOR CITY



Rationale:

Intent

We aim for a broad, balanced and progressive approach to teaching calculation strategies at Metropole giving children the confidence, conceptual understanding, speed and recall to be able to apply their learning effectively across all areas of Maths.

Implementation

Using concrete, pictorial and abstract approaches to learning everyday enhances the depth of understanding our children take from Maths. We focus on applying our calculations into reasoning and problems solving, ensuring our children are able to express their conceptual understanding and use accurate vocabulary to describe the processes used.

Impact

Our children show a deeper understanding of the processes used for calculations and can explain these using the correct mathematical vocabulary. Children show confidence in choosing the right resources and processes to support them in their learning and are able to transfer their calculation skills across into all mathematical concepts.



Calculations Overview for each Year

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.



Calculations Overview for each Year

Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays $2d \times 1d$ using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder- using lollipop sticks, times tables facts and repeated subtraction. $2d$ divided by $1d$ using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too



Times Tables Expectations:

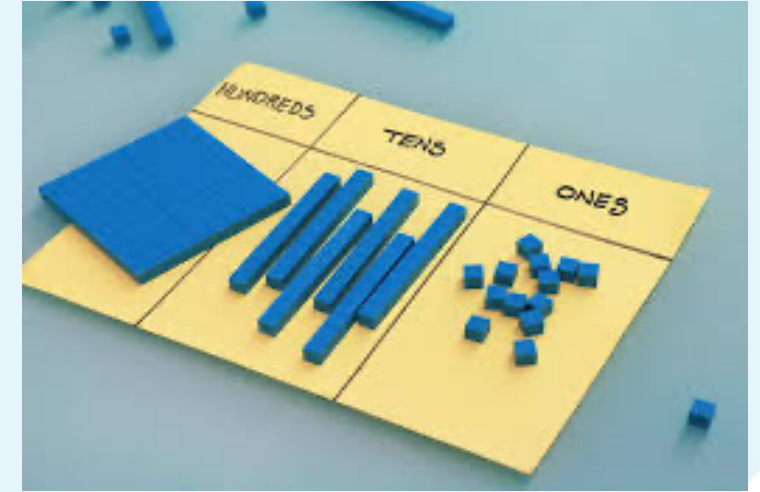
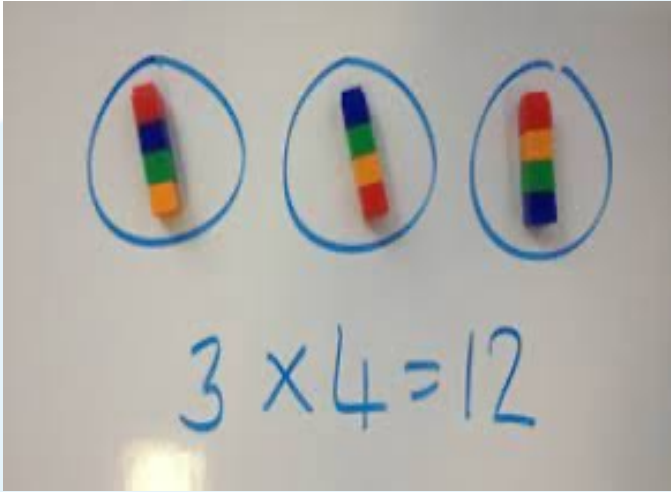
The British curriculum expectations are now:

- **All children** must know all times tables and division facts up to 12×12 by the end of Year 4.
- Testing will take place at the end of Year 4 to assess this. Each year group will have times table testing at the end of the academic year.
- Year 5 and 6 will involve revision and identifying children who may need interventions and further practice.
- FS children can start at a very practical level looking at counting in 2s, 5s and 10s.

Year 1	Count in multiples of 2, 5 and 10. Recall and use doubles of all numbers to 10 and corresponding halves.
Year 2	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
Year 3	Recall and use the multiplication and division facts for the 3, 4 and 8 multiplication tables.
Year 4	Recall and use multiplication and division facts for multiplication tables up to 12×12 .
Year 5	Revision of all multiplication and division facts up to 12×12 .
Year 6	Revision of all multiplication and division facts up to 12×12 .



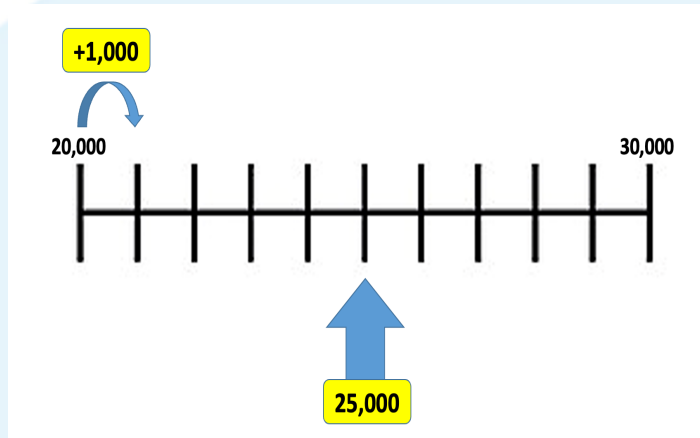
Concrete Representations



The children will benefit from using concrete resources to develop a deeper understanding of basic mathematical concepts. In class, we regularly use a variety of concrete resources as part of a concrete, pictorial, abstract approach to teaching.

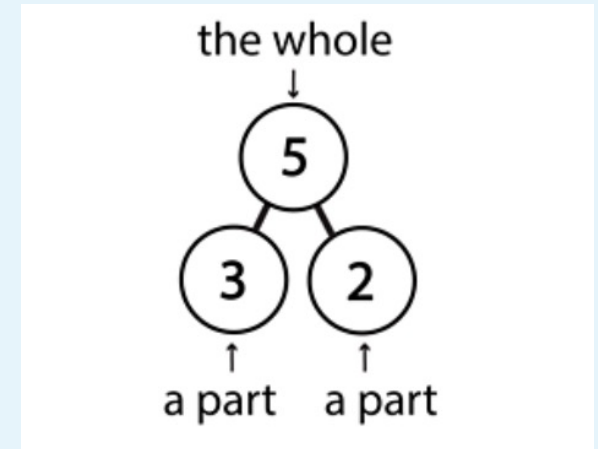


Pictorial Representations



What number is represented here?

M	HTH	TTH	TH	H	T	U	t	h
Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units	Tenths	Hundredths
		• •		•• ••	•	•• ••		



Pictorial resources and prompts are used to visually apply their understanding of basic mathematical concepts. In class, we regularly use a variety of pictorial resources such as the ones above as part of a concrete, pictorial, abstract approach to teaching.



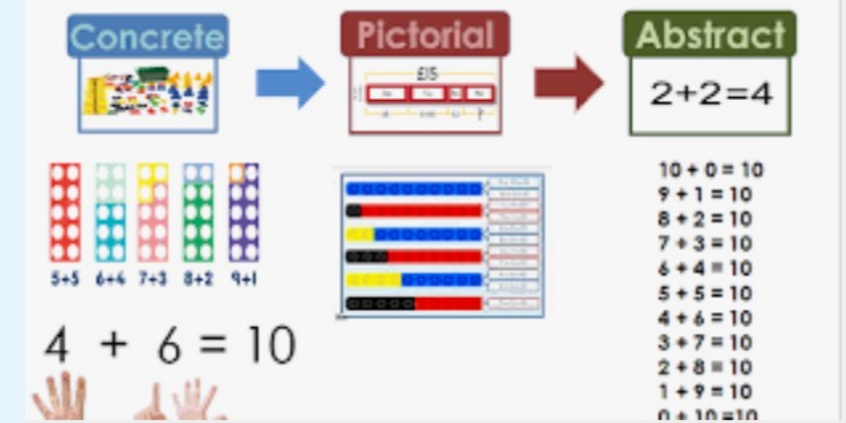
Abstract Representations

Finally, children learn to use abstract symbols to solve problems.

$$10 + 7 = 17$$

$$\begin{array}{r} 14 \\ 28 \\ \times 26 \\ \hline 168 \\ + 56 \\ \hline 728 \end{array}$$

$\rightarrow 28 \times 6$
 $\rightarrow 28 \times 20$



The abstract approach is the final stage where children replace pictorial with numbers and digits and can show understanding of the the process they are using.