



Goldenhill Primary Academy EYFS Maths Calculation Policy

2022-2023

Contents Page

Contents Page

Rationale	1
What is C.P.A. ?	2
How do I use this calculation policy?	3
Early Years Foundation Stage	4-5
Useful links	26

Maths Calculation Policy

2022-2023

Rationale:

This policy is intended to demonstrate how we teach different forms of calculation at Goldenhill Primary Academy . It is organised by year groups and designed to ensure progression for each operation in order to ensure smooth transition from one year group to the next. It also includes an overview of mental strategies required for each year group [Year 1-Year 6]. Mathematical understanding is developed through use of representations that are first of all concrete (e.g. base ten, apparatus), then pictorial (e.g. array, place value counters) to then facilitate abstract working (e.g. columnar addition, long multiplication).

It is important that conceptual understanding, supported by the use of representation, is secure for procedures and if at any point a pupil is struggling with a procedure, they should revert to concrete and/or pictorial resources and representations to solidify understanding or revisit the previous year's strategy.

This policy is designed to help teachers and staff members at our school ensure that calculation is taught consistently across the school and to aid them in helping children who may need extra support or challenges. It is expected that academics will work towards the fluency goals for each age group but that, where necessary, teachers will use approaches and materials from earlier year groups to bridge any gaps in a child's understanding.

This policy is also designed to help parents, carers and other family members support children's learning by letting them know the expectations for their child's year group and by providing an explanation of the methods used in our school.

Background to the CPA framework

- Children (and adults!) can find maths difficult because it is abstract. The CPA approach builds on children's existing knowledge by introducing abstract concepts in a concrete and tangible way. It involves moving from concrete materials, to pictorial representations, to abstract symbols and problems. The CPA framework is so established in Singapore maths teaching that the Ministry of Education will not approve any teaching materials that do not use the approach.

The Concrete Step of CPA

- Concrete is the “doing” stage. During this stage, students 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.

The Pictorial Step of CPA

- 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.

The Abstract step of CPA

- Abstract is the “symbolic” stage, where children use abstract symbols to model problems. Students 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, multiplication or division.

Importance of CPA and apparatus used:

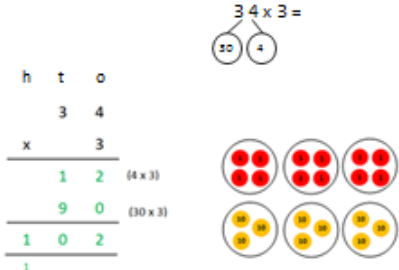
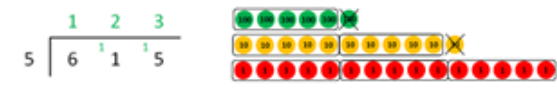
- The [MNP Primary Series](#) approach encourages teachers to vary the apparatus that children use in class. For example, students might one day use counters, another day they might use a ten frame. Likewise, children are encouraged to represent the day's maths problem in a variety of ways. For example, drawing an array, a number bond diagram or a bar model. By systematically varying the apparatus and methods used to solve a problem, children can craft powerful mental connections between the concrete, pictorial, and abstract phases. It is important to recognise that the CPA model is a progression. By the end of KS1, children need to be able to go beyond the use of concrete equipment to access learning using either pictorial representations or abstract understanding. What is important, therefore, is that all learners, however young, can see the connections between each representation.

Maths Calculation Policy 2022-2023

How do I use this calculation policy?

Each page follows a similar format to help you find the information you need. Addition is paired with subtraction and division with multiplication as these operations are the inverse (opposite) of each other.

These are the objectives from the National Curriculum.

NON-negotiable year group coverage:	
- recall multiplication and division facts for multiplication tables up to 12×12 - multiply two-digit and three-digit numbers by a one-digit number using formal written layout - divide a three-digit number by a one-digit number - estimate and use inverse operations to check answers to a calculation - solve problems involving multiplying and dividing, including the distributive law to multiply a two digit number by a one digit number, integer scaling problems and harder correspondence problems such as n objects are connecting to m objects	
Multiplication	Division
Expanded short multiplication of a two-digit number by single digit numbers.  <i>(children could use concrete counters or draw working out as a pictorial representation)</i> Vocabulary: lots of, groups, repeat, times, multiply, steps of, multiplied by, multiple of, double, product, expanded short multiplication.	Short division of 2-digit and 3-digit number by single digit numbers. Without regrouping  <i>(ensure are children are grouping not sharing)</i> With regrouping  <i>(children could use concrete counters or draw working out as a pictorial representation)</i> NB Children can be exposed to remainders at this stage but it should not act as a specific teaching point until Year 5. Vocabulary: sharing, share equally, into groups, equal, divided by, divided into, left over, remainder, how many groups, divisible by, how many ___ go into ___? inverse, quotient, divider, short division, regrouping

These examples show you the types of work and methods that children will be using in class.

This is some of the vocabulary that will be used in lessons and that the children are expected to know.

Year Reception – Maths Calculation Policy

NON-negotiable year group coverage:

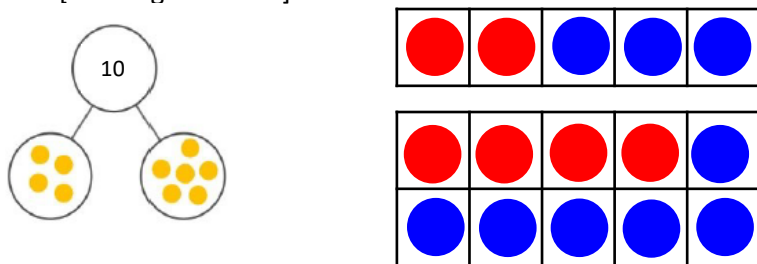
- Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer [within 10]
- Say one more and one less than a number

What adults could do:

- Use mathematical vocabulary and demonstrate methods of recording, using standard notation where appropriate
- Encourage children to make up their own story problems for other children to solve.

Addition

Composing numbers using concrete apparatus such as five / ten frames [working within 10]

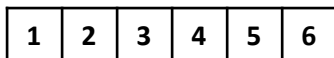


Addition as increasing by combining two or more groups using concrete apparatus. Children construct calculations verbally or using cards [encourage notations when appropriate]



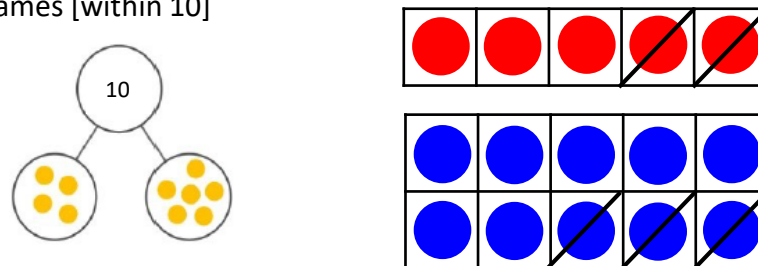
$$3 + 1 = 4$$

Number tracks can be used to support finding one more than a given number.



Subtraction

Decomposing numbers using concrete apparatus such as five / ten frames [within 10]

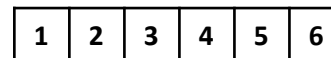


Subtraction as decreasing, taking away and finding the difference using concrete apparatus. Children construct calculations verbally or using cards [encourage notations when appropriate]



$$5 - 2 = 3$$

Number tracks can be used to support finding one more than a given number.



Vocabulary: add, plus, and, altogether, more, make, sum, total, how many more to make? numbers [zero – twenty and beyond], greater

Vocabulary: Subtract, take away, minus, leave, less, left over, how many are left, how many are gone, fewer

Year Reception – Maths Calculation Policy

NON-negotiable year group coverage:

- Solve problems, including doubling, halving and sharing.

What adults can do:

- Use mathematical vocabulary and demonstrate methods of recording, using standard notation where appropriate.
- Talk about the methods children use to answer a problem they have posed, e.g. 'Get one more, and then we will both have two.'
- Encourage children to extend problems, e.g. "Suppose there were three people to share the bricks between instead of two."

Multiplication

Multiplication can be introduced through repeated addition and doubling related to real life contexts.

Can you double the amount of spots on the ladybird?



This can be extended to writing the calculation by using addition [$5+5=10$].

Exceeding expectation - Children solve practical problems that involve combining groups of 2, 5, or 10.

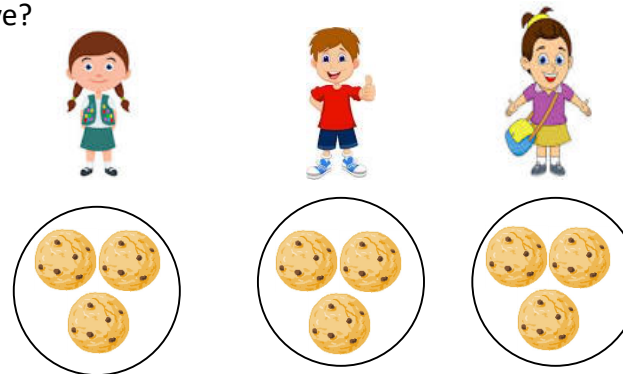
How many wheels are there altogether?



Division

Dividing by sharing into equal groups related to real life contexts.

There are 3 children and 12 biscuits. How many will each child have?



Dividing by practically halving an amount.



(children can show division using concrete apparatus and pictorial representations)

Vocabulary: Doubles, groups, ___ times, once, twice, lots of, groups of, repeated addition.

Vocabulary: Sharing, into groups, , halve, share, one each... two each... three each etc.