Benedict Biscop CE Academy

CALCULATION

POLICY

Review Date: **Autumn 2021**
Next Review Due: **Autumn 2023**
Person in Charge: **Assistant Headteacher**
Governance: **Chair of RA Committee**

This policy should be read in conjunction with the following policies;

- ➤ Marking policy
- ➤ CPA Approach for Addition, subtraction ,Multiplication & Division

The aim of this policy is to ensure all children leave Benedict Biscop Academy with a secure understanding of the four operations and can confidently use both written and mental calculation strategies in a range of contexts.

This policy states the required mental strategies and sets out the progression of written procedures that the children will use as they progress in their understanding of the four operations.

Note that in order for children to develop a full understanding of the written procedures, they must first have a firm understanding of place value.

Mathematical Vocabulary

It is essential that the children are exposed to and supported in developing quality and varied mathematical vocabulary. This will support them in accessing mathematical problems, as well as presenting mathematical justification, argument or reasoning – a key aim of the national curriculum.

Therefore, it is the responsibility of all staff to facilitate mathematical discussion within lessons through modelling the use of this vocabulary and displaying it within their classrooms. Furthermore, visual and concrete resources should be used wherever possible to ensure the maths curriculum is accessible for all learners.

Principles of the Policy

One of the key learning principles behind this policy is the concrete pictorial abstract approach (CPA). The concrete-pictorial-abstract approach, is based on research by psychologist Jerome Bruner, and suggests that there are three steps (or representations) necessary for children to develop understanding of a concept.

For children to have a deep understanding of the mathematical concepts being developed, they need to 'master' all three phases of the CPA approach. If a child has moved on from the concrete to the pictorial, it does not mean that the concrete cannot be used alongside the pictorial as an additional scaffold. If a child is working at the abstract stage, 'proving' something or 'working out' then concrete or pictorial representations could be used to develop a greater depth as pupils articulate their thinking /reasoning. Reinforcement is achieved by going back and forth between these representations. Linking abstract notation to pictorial/concrete representations and then the concrete/pictorial models to an abstract notation.

Concrete Representation

The *enactive stage*. Children are first introduced to an idea/skill/concept by acting it out with real objects, this could include large scale with the pupils themselves and also utilise resourced available in the outdoor environment. This is a *'hands on'* stage using real objects linked to real-life and the wider curriculum and/or mathematical equipment, (i.e. counters, cubes, bead string, five and ten frames, Dienes, place value counters etc.) and it is the foundation for *CONCEPTUAL UNDERSTANDING*.

Pictorial Representation

The *iconic stage*. A child has sufficiently understood the hands-on, **CONCRETE** experiences performed and can now relate them to **PICTORIAL** representations, such as a **DIAGRAM** or **PICTURES** of the problem.   **PICTORIAL** representations, such as the bar model, can also be used to **scaffold** understanding.

Abstract Representation

The *symbolic stage*. A child is now capable of representing problems by using **ABSTRACT** mathematical notation, for example: $12 \div 2 = 6$. This is the ultimate mode.