Maths Statement

At Carleton Rode VA Primary School the aim is for children to:

- Competently use maths in every-day life
- To think mathematically, creatively, logically and ultimately think in abstract ways that has benefit beyond maths
- Have the best chance of being successful in Maths at Secondary and Higher Education

We focus on delivering the key aims of the National Curriculum: Problem Solving, Reasoning and Fluency

by

- ensuring our *planning* provides opportunities for the above
- developing depth of understanding (mastery) through use of CPA approach
- a culture of enquiry and experiment and a culture of embracing mistakes as a way of deepening understanding
- allowing space for children to develop their thinking and logic, and to work independently and flexibly, to discover pattern and relationships.
- valuing speaking in maths and not compromising on the use of the correct terminology
- by ensuring children progress through the curriculum without gaps appearing in their understanding. (ie move onto the next year's objectives when they are ready for them)
- intervention to be put in place early to minimise the gaps appearing and/or growing.

This approach should support driving enjoyment of maths.

A lesson observation should be looking for

- Enjoyment/engagement
- Understanding
- Thinking mathematically,

The above fits with our school learning behaviours:

Independence
Critical Thinking
Resilience
Engagement
Taking Risks

Daily Planning should consider the following (but may not always follow this format):

- **Big Idea** (ie concept) – for guidance use the Teaching for Mastery booklets. Use concepts as starting point rather than the Year objectives. Consider for example a lesson all about about "zero" or all about the number "one"; take one calculation or question and see how many different ways there are of approaching it (eg is 343 a multiple of 3?);
- **Warm Up** - this may well not be directly linked to the main lesson. It can be used to reinforce previous lessons; to further assess degrees of fluency; to drive fluency; or to give a rich opportunity for reasoning: Odd One Out; What's the same? What's different?"Always, Sometimes, Never" true; What number of children in the class would the teacher prefer? 23 or 24?; Finding multiples of 4 on the board – how can I work this out with the bigger numbers?
- **Starter** - this is likely to be linked to the main lesson and *may* be very short e.g. finding the multiples of 4 on the board, counting up in 4s…
- **Main Lesson** - new learning for the day – be clear about use of CPA.
- **Word of the Day** (aim to introduce 3+ words a week – periodically consolidate words learnt to date)
- **Misconception** – ensure the misunderstandings happen in the lesson by ensuring the verbal or written questions expose them. eg If adding hundredths then a child is likely to get 4.53 + 2.35 correct but might make errors with 4.5 + 2.35 by adding tenths to hundredths. (see appendix for misconceptions). If you can't think of a misconception before the lesson, look out for them in the lesson, use them to deepen understanding with the others, and record for future reference.
- **Objectives** – there are likely to be more than one. They do not need to be introduced at the beginning of the lesson but make it clear on your planning and to an observer that this is an active choice for that particular lesson
- **Assessment Notes**

Learning Objectives vs Success Criteria

Success Criteria – there are two key success criteria that should be a halo of all maths:

- To complete the answer correctly (however mistakes should be welcomed as an opportunity to develop deeper understanding).
- To think mathematically to get to the answer efficiently ie do not count back for 65-58, recognise 180 – 40 is 8 – 4 tens, 160 + 282 +140 is best to be done as 160 + 140 = 300, 300 + 282 = 582.

How to follow a process eg for counting-on should be taught at times and you sometimes might insist children learn a certain process so they have it in their "tool-kit" but children should always be encouraged to look for the most efficient way. Different ways of answering one question should be looked at (in the main part or the warm-up part of a lesson) in order to share different thinking.

Learning Objectives – there are likely to be more than one for any lesson. These may be shared at the beginning of a lesson or at the end with children extracting what they think they are. However, make it clear in planning that this is what you are doing.

Eg for a lesson on rounding …

- Can round a number to 10, 100, 1000
- Can make appropriate choices about how far to round a number when given the context

Or

- Can round a number to the nearest 10 when given a 2 digit number (or 3 or 4)
- Can use rounding to estimate answers to addition or subtraction questions

Division

- Understand what division is (are you sharing or finding equal groups?)
- How to use equipment or a picture to show this
- Can explain why division is the inverse of multiplication

If the children tell you they have learnt something else in this lesson, or have taken the lesson in a slightly different direction, then the resulting learning objectives should be welcomed and you should amend your plan.

CPA

Concrete equipment available *includes*:

- 10 base / Dienes
- Numicon
- Multi-link cubes
- Cuisiniere rods
- Bead strings
- Straws, counters (single colour and two colour),

The pictorial stage is the most likely one to be missed but is the most useful as can be drawn on when concrete equipment is not available. eg bar models in particular are good in problem solving,

Note, number lines are at the more abstract end of pictorial.

Times tables

Why are they important? Some argue that you don't need to learn times tables as you can work it out. However, recognising multiples in numbers and building up blocks in multiplication and division is greatly aided by instant recognition or recall. Our policy is therefore to learn them

- Start with counting up in multiples of a number
- Learn times tables but also have strategies for working one out if unable to recall eg 10 x 7 = 70 so 9 x 7 = 70 -7
- Learn 12 x (NOT 10 x)

- Key that children recognise multiples in numbers eg 210 is a multiple of 3 and 7 because 3x7 = 21
- Learn in this order with guide for year group, encouraging mathematical connections, patterns and relationships.

Calculation Guidelines

Throughout, children should be encouraged to

- Look for opportunities to work efficiently and mentally where possible using number bonds and known facts. eg
    - 11+9 = 20 so 110 + 90 = 200
    - 160 + 274 + 340 = add up the 160 and 240 first
- Learn to estimate first eg 121 + 490 will be approximately 120 + 500 = 620. Does estimating need to be introduced at a particular year group?
- Sense check their answer eg by looking at their estimate, or doing the inverse operation
- When errors are made, should be encouraged to discuss them and work through the problem, not just re-teach them the method.
- Partitioning skills need to be developed to underpin all calculations and don't just teach partitioning into 100s, 10s and units: eg 74 can be partitioned into 70 + 4 or 60 +14
- Most children will not learn vertical methods (except addition) until Year 6.
- However, DO teach children to recognise the calculations in all their formats ie vertical as well as horizontal.
- The connections between calculations should be taught especially the inverse relationship between addition and subtraction, multiplication and division, but also addition as repeated addition = multiplication etc.
- Division should be taught as the inverse of multiplication (repeated addition), NOT repeated subtraction although welcome children making that connection.
- Do be careful how you assess calculation ie a list of questions that are all presented exactly the same and with the same number of digits in the same place value is unlikely to fully assess understanding. See assessment section.
- All calculations should NOT be taught in silos. Connections between them should be constantly made explicit.

Assessment

Within a lesson or series of lessons, how can you be sure they really have "got it"?

Case study

Your learning objective may be adding numbers with hundredths.

If you ask children to add 4.58 + 3.21 they are likely to get this correct as they have corresponding digits ie the 8 hundredths go with the 1 hundredth and the 5 tenths go with the 2 tenths etc. ie the calculation provided gives a framework but doesn't expose their lack of understanding of place value. This is particularly the case if they use vertical addition method.

However if you ask they to add 4.5 + 3.21 then errors may appear: they may well add the 5 tenths to the 1 hundredth.

Other errors seen

4.65 + 5.3 = 9.68

4.65 + 5.3 = 9.95

0.05 + 0.07 = 0.012

To fully assess you need to provide the "twist" to see if they have depth and mastery of understanding. This twist is part of the problem solving element of the national curriculum.

We therefore ensure that questions within lessons or in a mini-assessment at the end of a unit of work are progressively more difficult to ensure there are not gaps in understanding being masked.

Other

Marking

However next steps in maths is different from literacy: there will only be a next step written in the book if

- there is a gap in a child's knowledge that needs completing eg 10 bonds. This might need 1 to 1 intervention or small group work.

Or

- if there is an ongoing barrier for example, cramping up their working so the place value of numbers is then confused.

Children to use

- Pink pen to comment on their work.
- Purple pen to make corrections.

Presentation

It is suggested that the children should write the problem and calculation, along with the final answer in a neat area. Their working may be less neat in the "working area" of their page.

And

Outdoors learning and Cross Curricular opportunities are pursued whenever possible as general good practice.

Calculators are not used in an exam but can used when appropriate in lessons eg to check answers; using to find factors of very big numbers.