



## Ash Grove Mathematics Policy

### Mastery Teaching in Mathematics

In line with Curriculum 2014, Ash Grove has implemented a Mastery curriculum for the teaching of Mathematics. We have adopted a “teaching for depth” approach. The focus is on teaching fewer topics but teaching them in greater depth which is in keeping with the 2014 National Curriculum approach of moving the majority of children in the class along with the content at broadly the same pace.

This means making sure that all children have “mastery” of the concepts – they can apply them in a range and variety of contexts and situations. It does not mean holding back children who are capable of addressing a greater level of challenge. When children are ready for a greater depth of challenge, they are given problems to solve, which require a greater degree of reasoning rather problems, which require the same level of reasoning but with a greater number range. That can lead to more superficial learning rather than the deeper learning that we want. Pupils who grasp concepts rapidly will be challenged with richer, deeper problems rather than accelerated into new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding including through additional practice before moving on.

### Big Ideas and Small Step Progression

Big Idea objectives form the basis of the Key Performance Indicators for each year group. Within the big ideas, the small step progression of a particular mathematical concept is planned by the class teacher on a weekly basis in collaboration with the Maths subject leader. The Big Ideas as outlined in the Yearly Maths Progression Maps, are the key assessment points from which pupil attainment and progress is tracked across an academic year in each year group. The “Smaller Steps” are the success criteria, the building blocks for achieving the big ideas. “Differentiation” is achieved through scaffolding children differently towards the end point. Some children may need additional support on the concepts being studied outside the lesson in “timely” interventions.

### Lesson Structure

A typical lesson might be:

- Connections and Patterns – procedural variation
- Hook Problem – cooperative learning structure. This will often contain a reasoning context as well as posing a problem related to the maths to be learned. Teachers may listen and question more than intervene in this section so that they are aware of the children’s misconceptions.
- Cooperative Group Explanation of the Approach and the Solution. The specific focus is on the ‘How’ and the ‘Why’ in order to draw out misconceptions followed by a discussion of each solution. Cooperative learning structures work well at this point. The teacher then inputs on developing the “next steps” and modelling the most efficient method. This will include the use of concrete manipulatives as well as a wide variation of pictorial representations and images of the mathematical concept. Crucial to this part of the lesson is the direct use of children’s misconceptions as teaching points. The use of the visualiser to highlight misconceptions and for children to share their mathematical reasoning is also an integral part.
- Independent Problem Solving and Reasoning with teacher input to children who are struggling with that concept. Approximately 3 questions, which become progressively deeper conceptually, but move the children on from the hook problem to independent application of skills and concepts. Mini plenaries are integral in order to continue to share children’s misconceptions (in a positive way) as well as their mathematical reasoning.
- Greater Depth – There will be problems and reasoning contexts which children can move on to once they have shown that they have a deep understanding of the basic ideas. These will challenge children through deeper reasoning rather than moving on to a different concept or a higher number range.

### Procedural and Conceptual Variation

The definition of Variation can be broken down into two key areas:

**Conceptual Variation:** The opportunity to work on different representations of the same mathematical idea. This might be for instance looking and multiple representations of the number 54. with Base 10, Place Value counters, Gattegno grid, arrow cards, 100 square etc. These multiple representations will ‘showcase’ to pupils the different conceptual ideas that underpin a mathematical idea. So in the context of place value, some will reveal the quantity/ value of a digit, some will reveal the importance of position of a digit, others will support the order of the number and some will reveal the additive or multiplicative nature of place value.

**Procedural Variation:** This is used to support pupils' deeper understanding of a mathematical procedure or process. This might be to compare the same procedure used to calculate two different sets of numbers. By asking the pupils to compare two successive procedures where the first is linked to a second. One can observe relationships, observe the variant and invariant properties of the procedure - i.e. **what stays the same and what changes?** (depending on the numbers/conditions) leading to generalising about the procedure.

## Patterns and Connections

Patterns and Connections places an emphasis on procedural variation and will be seen at the beginning of a lesson and often links to prior learning and focuses on the consolidation of skills. An example is below.

Small Step Variation – recall prior learning

Correct or Not Correct  
Tick the ones you think are correct

$3124 + 1265 = 3123 + 1266$   
 $3124 + 1262 = 3120 + 1263$   
 $5699 - 3699 = 5700 - 3700$   
 $5698 - 3698 = 3701 - 3700$   
 $4789 - 2589 = 4800 - 2601$   
 $7017 - 5678 = 7000 - 5661$

Patterns and Connections – Compensation

$2,370 + 1,999 =$   
 $2,370 + 1,999 =$   
 $2,370 + 1,997 =$   
 $2,369 + 1,997 =$   
 $2,368 + 1,996 =$   
 $2,368 + 1,996 = 2,364 +$   
Insert either < or >  
 $2,368 + 1,996 \quad 2,364 + 1,996$

## Misconceptions

Misconceptions are specifically used as teaching points at all points throughout a lesson. There is a culture in our teaching of mathematics where mistakes are celebrated and children are provided with the opportunity to unpick and fix mistakes through in depth reasoning, discussion and exploration. Emphasis is placed on teaching through misconceptions in every lesson since it is recognised as an invaluable way for children to explain their mathematical thinking.

## Timely Interventions

When a child has demonstrated a conceptual misconception or has made multiple errors, it is noted that a further teaching and learning point is required. This is then addressed either on an individual basis or as a small group ideally by the class teacher prior to the next lesson in order to ensure the child is ready to move on to the next step.

## Formative Assessment

### Marking

Children will receive a supportive comment for their work where the teacher feels it is necessary. Where appropriate, children may mark their own work collaboratively under guidance from the class teacher.

Where children have made errors on their work, these will be addressed through the use of the following symbols: corrections ©, misconceptions (m), timely interventions (TI). Children will address these errors with purple pen to show where they have reflected on their work, either independently or with further support from the class teacher..

**Next steps** will be automatically evident in independent work in books from the subsequent progression of lessons; this will continue the cycle of all children accessing problem solving and reasoning in every lesson.

To acknowledge that the closing the gap activity has ensured the child has now mastered the small step, a wish achieved stamp will be used. The cycle is in line with our Mastery approach which ensures that the majority of children are broadly progressing through the curriculum at the same pace.

### Peer Assessment evidenced in books.

Peer assessment is used as a method through which to close the gap. For example, children are paired and work together on fixing corrections or addressing misconceptions using the purple pen. Both children initial the completed work and supported child rates their confidence of mastery of the skill from 1-3 (1 being most confident). This will indicate whether further timely interventions are required.

### Feedback

Collaborative learning structures ensure peer - peer feedback through explanation and talk tasks such as rally coach and numbered heads together or think-pair-share. These structures are planned in as a platform for reasoning and problem solving within the lesson and also to reveal misconceptions.

### Effective Questioning

A range of open questions are used to ensure children are given rich opportunities to articulate within the following contexts:

Generalisation – How can you prove that all multiples of 4 are also multiples of 8?

All Possibilities – How do you know you have found them all?

Conjecture – Always, sometimes or never true

Misconceptions – Correct or not correct?

This continuous probing of children's depth of understanding is a means by which children's mastery of small steps is assessed alongside evidence of independent work in books.

### **Summative Assessment**

Pupils' books are analysed in half termly pupil progress meetings to verify judgements made by teachers and to put into place further interventions as required. This is then recorded on pupil progress reports for Maths for each class.

Evidence from book scrutiny, lesson observations and pupil voice is used to track coverage and maintain consistency in our approach across all classes.

### **Moderation**

Termly, the Maths Subject Leaders take a sample of books from each year group and verify the judgements of pupil progress using pupil attainment across a range of contexts evidenced in Maths books.

### **Reporting to Parents**

At the end of the autumn and spring terms, information is shared with parents (in a report format) relating to the child's strengths within each of the 'Big Ideas' in Mathematics. Furthermore, their next steps are identified and are also communicated in a written form. At the end of the Summer term, parents are informed as to whether their child is **working towards, at expected standard or has reached greater depth** in their overall conceptual understanding of the key performance indicators attributed to each year group.

**Devised by Lisa Finnegan 29<sup>th</sup> November 2016**