

Teaching for depth in mathematics

Ash Grove follows a “teaching for depth” approach to mathematics, which is sometimes termed “mastery”. This approach enables all children to master the mathematics curriculum and draws inspiration from a range of sources. It draws heavily upon research conducted by the EEF (Education Endowment Fund) and their recommendations.

What is the intention of our curriculum?

The intention is to build long lasting learning through progressive acquisition of knowledge and skills and retrieval practice. This helps our children to know and remember more through both well timed repetition and carefully planned tasks to introduce new learning.

We believe that all children can learn mathematics with hard work, effort and good, supportive teaching. Differentiation by task or setting has not traditionally led to better outcomes for lower attaining pupils. All year groups are usually taught in mixed attainment classes, where scaffolding, timely intervention and teachers and other adults working directly with those who are struggling to grasp a concept provide more effective differentiation.

“Faster grasping” children are given “going deeper” questions to develop their ability to reason, prove or question an approach. Collaborative learning allows children support each other’s progress. Children understand that “going deeper” challenges will allow them to construct and apply their learning with additional challenge and are not only reserved for higher attaining children. Other children will attempt them as and when they can. What is going deeper for each depends upon where they currently are in their mathematics learning,

Questions structured with a “greater depth” of complexity will also be provided allowing some children to work towards a fuller understanding through deeper exploration and investigation of content and context.

How is our curriculum designed and implemented?

Whilst teaching the National Curriculum, we do not follow a particular scheme of work in terms of materials and rate of coverage. The NCETM “spine” documents under-pin our pedagogical approach and offer guidance so that teachers can plan and write lessons that meet the needs of each class. Small steps for both conceptual and procedural understanding are planned for, giving due consideration to common misconceptions that are likely to occur. Additional quality materials may be used to supplement these.

Teachers teach topics until they feel that an appropriate depth of understanding has been achieved by the vast majority of the group. Gaps in learning are identified in a timely

manner by teachers and addressed through “same day intervention”. We expect all topics within the National Curriculum to have been covered to some degree over the year

Children use concrete, pictorial and abstract models for each topic as appropriate to the learning context. Research conducted by the EEF underpins our expectation that a variety of manipulatives and representations will be used in all year groups and with children at all levels of attainment to support learning before procedural methods are used. This allows children to select from a range of strategies for both efficiency and to support success.

Procedural methods for calculation are taught alongside mental and structural methods for fluency and variation. Children will be expected to apply this learning within a range of contexts rather than completing extended procedural practice. Fluency does not equate to speed but to efficient choice of strategy which may well increase speed, particularly when trying to recall times tables.

A typical lesson will usually include:

- A brief problem linked to prior learning, reviewing and consolidation patterns or connections in mathematics. It may focus on procedural fluency or reasoning. Activation of prior knowledge of task, strategy and self may also form part of this activity.
- A “hook” problem or calculation on which the children work collaboratively enabling them to share their initial ideas and strategies.
- A series of activities with a balance of direct instruction and collaboration and dialogue aimed at unpicking the small idea around which the lesson is based.
- Independent pupil application using questions similar to the lesson hook and one or two further questions which progressively “spin” the concept in different contexts and with different types of reasoning. If children can understand the concept in different ways, in different contexts and with different types of reasoning, the concept has probably been learned – changed in their long term memory.
- Teachers will select or pupils will actively ask for more help. Some children may move on to problems of greater complexity that may be completed over a series of lessons or in additional time with or without an adult,
- The plenary may focus on addressing a misconception, self or peer review, or further assessment depending on where the lesson sits in the cycle of teaching and learning. Mistakes are valued and celebrated. Unpicking misconceptions so that children evaluate their thinking is vital in scaffolding children towards greater independent evaluation and learning.

Marking is timely and allows children to complete, correct and go deeper with their learning. Children who make no mistakes are not being sufficiently challenged and we expect all children to respond to marking challenge/next steps. Sometimes this may be more or less frequent, but should not be a barrier to motivation and enjoyment. The aim of this is not simply for correction, but for recall, reflection and self-monitoring.

There will be times when this lesson structure does not suit the learning taking place. When longer investigations, games or kinaesthetic activities are taking place, the structure will be that which best suits the learning process.

On a regular basis children will be given routine arithmetic questions or problems as a low stakes recall of previous teaching on a range of topics. Depending on the outcome, more or less time in that lesson will be devoted to reviewing and correcting errors, but it does not take the place of quality teaching in that lesson based on the topic planned for. This is an example of well-timed repetition and leads to greater fluency. Repeated exposure and consideration of key concepts over and over again in different contexts leads to better understanding.

When teachers can, they offer timely, sometimes same day, intervention to ensure gaps and misconceptions are addressed before moving on. Sometimes this is after school and may review previous topics or pre-teach new ones. This type of feedback relates to and should produce improvement in the child's learning. It may focus on an activity, a process, or the child's thinking and self-regulations strategies.