KernowLearning

St Agnes Academy Curriculum Statement for Maths

Curriculum Intent

The mastery learning model forms the basis of our approach to maths teaching. This means spending greater time going into depth about a subject, in order to develop a deep and secure understanding, as opposed to racing through a broader content at a more superficial level. As a primary school, it is our duty to ensure that children have a solid, concrete understanding of subject knowledge and skills, which can be applied flexibly and used as a solid foundation for later learning in secondary school and beyond.

We focus on all children achieving what is expected of their age group and not going beyond this. Evidence shows that children need to be able to understand a concept, apply it in a range of situations and then be creative to really understand it. At our school no child will be taught content from the year above them. They will spend time becoming true masters of content, applying and being creative with new skills and knowledge in multiple ways.

More able children at our school will be extended by being required to apply what they have learned, flexibly, to new situations and being encouraged to discover links and connections between different areas of learning e.g. linking learning about factor pairs, prime numbers and commutativity to problems relating to the area of rectangles.

Children at our school experience maths as a collaborative, language rich, process of discovery rather than as a process of applying algorithms provided by the teacher.

'White Rose!' will be used to deliver the National Curriculum (2014). Specifics of calculation methods used can be found in our calculation policy. Details of mental maths strategies can be found in our yearly mental maths documents. We follow a spiral curriculum, where topics are revisited yearly. Content from the previous year is briefly revised before new, related learning is introduced.

Curriculum Implementation

Pupils in KS1 are engaged in maths activities for one hour per day. This increases to 1hour and 15 minutes in KS2. In both key stages, this consists of a White Rose l=Lesson and 15 minutes throughout the day spent practising and consolidating mental maths skills.

Structure of lesson:

Recapping previous learning

Flashback slides are used to recap learning from the previous, day, week, topic and further back in the year.

Exploration

Each maths lesson starts by presenting students with an 'easy access' problem which is be extended through asking the question "How do you know?" This is also known as the 'anchor task'. The anchor task (where possible) allows students to use concrete/visual materials (such as unifix cubes, counters etc) to explore different methods to solve the given problem. (The anchor task in 'Whie Rose' is called 'True or False?').

Get Ready

These slides in a White Rose look at the basic underpinning number facts, calculations, or knowledge that will be used throughout the rest of the lesson.

Structured learning

This section of the lesson forms the central part of the planned learning activity. (In 'White Rose' this section is called 'Let's Learn'). Teachers may use the White Rose maths slides as part of teaching and explanation, but this should be accompanied by further exemplification e.g. using the flipchart or manipulatives. Children should be actively engaged in the teaching answering questions, writing responses on whiteboards and/or solving problems using concrete apparatus or pictorial representations.

Independent practise

Children complete a worksheet in their workbook. Most of these questions are completed independently, although those with a speech bubble icon next to them should be discussed with a partner. Manipulatives should be available to the children when completing questions with a unifix icon next to them.

Key pedagogical tools:

Concrete-pictorial-abstract (CPA) approach

When new learning is introduced, the CPA approach is used, whatever the year group. First, concrete materials are provided. These could take the form of counters, base 10 materials, tens frames, nets of shapes, 2-d/3-d shapes etc. depending on what is being taught. The next stage is pictorial –where children use pictures and diagrams, rather than concrete objects, to help them solve problems. Finally, the abstract stage is reached, where learners represent mathematical ideas and problems using calculations and formulae. Different learners will progress through these stages at different rates.

Aiding visualisation

Visualisation in maths should stretch beyond the use of drawings and diagrams to illustrate a method. Rather than the teacher simply presenting problems/methods visually to support understanding, students are continually encouraged to develop and use their own visual representations as this provides ways in which they can access, model and plan a strategy to solve a problem. Visualisation is further facilitated through appropriate questioning, such as "Can you imagine?", "Can you picture in your head?" and "Can you show me what that would look like?"

Developing metacognition

To develop metacognitive skills students are always encouraged work out for themselves if they are on the right track. Children are not always told if they are right or wrong, instead they are encouraged to use their own methods to check their answer. Questions such as "Is that right?", "Are you sure?", "How do you know?", "Can you explain to your friend how you know?" are used regularly to prompt the student to find a way of making judgements on their own work.

Modelling

To help develop mathematical fluency and understanding teachers ensure that all workings are modelled neatly and accurately on the board and that the correct mathematical language is used consistently within the lesson. Of equal importance, is the modelling of the desired behaviour when students are confronted with problems common to the maths classroom such as making a mistake, using an incorrect method or getting stuck on a particular question. To help improve resilience and perseverance teachers continually model what to do in these situations by doing the same themselves and regularly reminding students how they should respond to each challenge they may be faced with.

Questioning

Questioning forms a large part of the teacher's dialogue in a maths lesson. Questions are not always open ended but are used continuously to check understanding, support struggling learners and stretch the more able. All the questions asked are linked to the key components and pedagogical skills required to deliver an effective lesson such as reflection, visualisation and metacognition.

Differentiation:

Assessment of understanding

The expectation in every Maths lesson is that all students are able to achieve the learning objective but in a number of different ways and to varying depths of understanding. A students' readiness to be stretched or need to be supported is assessed through observation and questioning which take place at the earliest possible opportunity.

Depth before acceleration

At no point during the lesson are students accelerated onto new content until the full range of 'extension through deepening' activities have been fully exhausted. Some of the key questions used to deepen the learning for more able students include:

- "Can you do it another way?"
- "Is there a better method?"
- "How do you know your method is the best?"

Star Questions

Questions that require a deeper understanding to answer but don't accelerate into the next year's curriculum. These usually involve applying the content of the lesson flexibly to new situation or reasoning using ideas covered in the lesson.

Use of visual and concrete materials

To aid understanding of a topic, concrete and/or visual materials are available to all students in every lesson where this is possible. Less able students will find being able to manipulate physical objects strengthens their conceptual understanding, while the more able students will be able to manipulate objects in different ways in order to identify different methods of solving a problem. Some of the concrete materials that are commonly used are base ten apparatus, PV counters, unifix cubes, counters and ten frames.

Multiple methods

One of the most powerful ways of extending more able students is to regularly ask and encourage them to obtain their final answer using a different method. It is important that learners are reminded that the method they used to reach their final answer is not as important as their understanding of why it worked. Less able learners should not be pushed to find multiple methods until they have fully grasped the first. In a Maths lesson, one method with a full understanding is always enough.

Level of abstraction

Another way of differentiating is to increase/decrease the level of abstraction. This can be done by providing/removing visual/concrete materials or asking students to use (and explain) formal abstract methods (such as exchange during subtraction/division). Attempting to increase the complexity of a problem simply by replacing the initial numbers with those of a greater value is discouraged, as this rarely leads to a greater depth of understanding.

Group work

Students are regularly directed to work in pairs/groups to discuss problems and share their ideas. This does not need to be set up as a formal 'group work' activity, but instead is the ongoing expectation in Maths lessons.

As much as possible, more able students are encouraged to help the less able understand concepts they are struggling with, and for this reason, mixed ability seating is the preferred classroom arrangement. Once a more able student has fully grasped a new

concept, they are prompted to master the skill of helping others by identifying where a student has gone wrong, highlighting the mistake that has been made and demonstrating how to avoid that mistake in the future. At the same time, the more able students is encouraged to develop their own understanding as to why another student has found a particular question more challenging than another. This process will ensure that less able students can be supported when the teacher is unavailable, foster a positive and supportive learning environment and help more able students gain an appreciation of the mathematical demand involved in different types of questions and the associated misconceptions/common mistakes.

Teachers are supported to follow this structure through the use of formal and informal lesson observations. Peer observations are also encouraged. Any teacher can also observe the maths lead teaching and plan collaboratively with the maths lead.

Monitoring Progress

Children are assessed daily through questioning and marking of workbooks. Children who have not achieved an objective receive same day intervention in order to catch up before the next lesson. This often takes the form of small group teaching during guided practice or pre-teaching in a small group. At the end of each unit of work, children complete a review. The classes reviews are used by the teacher to establish whether any element should be retaught before moving on to the next unit. Children complete termly PUMA tests to monitor long term retention and progress through the year. SATS (year 2 and year 6) and end of year teacher judgements, combined with end of year PUMA tests are used to track children's progress through the school.

Curriculum Impact

Most children achieve age-related expectations by the time they leave St-Agnes and the vast majority maintain good progress through each key stage. We aim for all children to know their times tables up to 12 X 12 by the end of year 4. The curriculum ensures confidence and flexibility in maths so children build the resilience necessary for the next phase of their learning.

We aim to develop children who have the curiosity and courage to engage with, and construct their own, new challenges; children who value the contributions of others and can work collaboratively towards joint solutions and children who have the compassion to help others who may be struggling. Explanation and discussion develop children's confidence in oracy.

Maths develops children's analytic skills and resilience. Frequent requests to explain their methods, reasoning and how they 'know that they know' develop metacognitive skills. Explaining reasoning to others also helps to develop communication and presentation skills. Children develop their ability to activate prior learning, and make links between different areas of learning, through 'In Focus' problems ans star questions.