

# Maths Policy

| <b>Policy Creation and Review</b> |   |
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## Thinking skills:

Thinking skills and heuristics are essential for mathematical problem solving. Thinking skills are skills that can be used in a thinking process such as classifying, comparing, analysing parts and whole, identifying patterns and relationships, induction, deduction, generalising and spatial visualisation.

Heuristics are general rules of thumb about what students can do to tackle a problem when the solution to that problem is not obvious. These include using a representation (e.g. drawing a diagram, tabulating), making a guess (eg trial and improvement/guess and check, making a supposition), walking through the process (eg acting it out, working backwards) and changing the problem (eg simplifying the problem, considering special cases).

## Key approaches to learning:

Learning is about making connections:

- The spiral curriculum (curriculum approach) - connecting to extend existing knowledge and skills.
- The Concrete-Pictorial-Abstract (C-P-A) development of concepts (pedagogical approach) that connect to make sense of learning
- Learning experiences (learning approach) - connections to realise the curriculum.

## Maths mastery teaching time line and approach:

Our maths lessons adopt a four part structure of:

- Anchor (Hook - Opportunity for exploration).
- Guidance (Main teaching where teacher models examples).
- Independent (Students have the opportunity to practice examples themselves independently)
- Reflection, explanation and reasoning (opportunity to review learning and misconceptions through plenaries and mini plenaries).

A heavy emphasis is placed on the Concrete-Pictorial-Abstract (C-P-A) approach. Research in learning from key theorists\* in education is heavily referred to in promoting students positive attitudes to learning. The following are fundamental in ensuring that such key aspects are being delivered daily in the classroom:

- Opportunities for students to interact with their peers (Vygotsky).
- Concrete activities using hands-on resources
- Exploration (Piaget).

- Safety of learning environment (Promoting 'productive failure'-Learning from mistakes).

*\*(Dienes, Bruner, Vygotsky, Skemp, Piaget).*

We want pupils at Odessa to become independent mathematical learners who are encouraged to reason and explain their learning. Such skills can be reinforced, embedded and developed further in order to be used and applied in different contexts.

### **Odessa infant school teaching time line:**

The duration of Mathematical lesson at Odessa is approximately 1 hour. They follow a generic format.

### **Planning:**

The curriculum overview is organised within the four operations of number (Numerical reasoning; Additive reasoning; Multiplicative reasoning and Geometric reasoning). These skills are to be taught over a 3 to 4 week block with frequent opportunities to use and apply within varying contexts such as measure and statistics.

**Long term/Medium term planning in mathematics:** Is based on the Odessa whole school overview for Mathematics. The concepts to be taught and covered are listed accordingly. Teachers, need to ensure these are broken down into child friendly objectives that are seen to be progressive in their learning journey over the week.

**Short term planning** is carried out on a weekly basis. All planning includes a skill-based learning objective with succinct success criteria, an anchor task, a progressive sequence, key AFL strategies, key questioning, relevant vocabulary and resources, mastery and reasoning.

**Short term planning** is collected and monitored by the maths coordinator and SLT.

### **Mental maths:**

#### **Why mental mathematics and visualisation?**

Mental mathematics is part of any mathematical activity and is the quickest way to raise standards in school. As children become more confident at seeing mathematics and working things out in their heads, they become better at problem solving and reasoning as well as calculating or working with shape and measure.

Mental activity needs teaching and practice to develop efficient and effective ways of thinking and organising thoughts and ideas. We need to help children to:

- Carry and manipulate information in their heads.
- Visualise images and to interpret and analyse what they see.
- Select and organise information in a systematic and logical way, identifying patterns and applying logical reasoning.

## **Visualisation**

To use visualisation successfully, children need practical experience, along with opportunities to talk about the equipment they are using and the images they are forming in their head. They also need to learn and use the related mathematical language. Visualisation could also involve the children making some notes or jottings to help them. These should not replace the visualisation, but provide support when children can no longer hold everything in their minds. Being able to listen to description and interpret the context or task to manipulate the image can be challenging for some children, so making jottings of this kind might be an important step in the development of their visualisation.

## **Teaching mental maths at Odessa**

The teaching of mental maths at Odessa should consist of objectives taken from the key learning document and visualisation activities. Mental maths is taught every day and activities should focus predominantly on number.

Planning is undertaken at three levels:

**Long term planning** are the objectives and concepts that are set out in 'Securing Progression in Mathematics.' Teachers select the objectives and concepts that fit with the topic that is outlined in the Odessa overview.

**Short term planning** is carried out on a weekly basis. All planning includes a skill based learning objective with succinct success criteria, a mental starter, a progressive teaching sequence, key AFL strategies, key questioning, relevant vocabulary and resources.

The medium and short term planning is collected and monitored by the maths coordinator and SLT.

## **Practical learning in mathematics.**

Practical, hands-on learning in mathematics is essential because it helps bring together both abstract and practical everyday learning of mathematical concepts. Practical maths puts learning into a real-life context and makes it relevant. A child's learning and development in mathematics will be deeper and they will become more competent mathematicians.

### **Practical learning at Odessa.**

The teaching of Mathematics at Odessa should give opportunities for children to develop their mathematical skills through practical activities. Due to the time constraints of the approx. 1hr lesson teachers need to ensure that practical lessons are well planned, well-resourced and simple, but open to extension and further challenge. Children must have the opportunity to complete a short practical task, followed by time for them to record their findings.

Areas of the mathematics curriculum where practical learning is necessary include weight, length, capacity, money and sometimes fractions. In KS1 practical learning is also needed when the children are beginning to understand multiplication and division. All children at Odessa should experience some practical learning each term. The practical task could be used as a means of solving the problem followed by the children recording what they have found out.

### **Teaching and learning methods and approaches.**

The duration of a mathematics lesson at Odessa is typically 1 hour. They follow a generic format, with teacher input and modelling (15-20 minutes), children's independent learning time with mini plenaries (30-35 minutes) and full plenary (5 minutes).

Teaching and learning times in mathematics may vary depending on the nature of the maths being taught or competency of the children. For example, if the children are confident with the skill or concept that is being taught, the teacher should give more time for independent learning. If the children are struggling with the objective then more time should be given over for teacher modelling and explanation. However all lessons should give children sufficient time to work independently.

The teacher of mathematics at Odessa provides opportunities for:

- Group work
- Paired work
- Whole class teaching
- Individual work

Pupils engage in:

- The development of mental strategies.
- Written methods
- Practical work
- Investigational work
- Problem solving
- Mathematical discussion
- Consolidation of learning