

Mathematics at Arunside

Intent

At Arunside, we aim for our children:

- To have a passion for mathematics;
- To understand where mathematics can take them in future careers;
- To have the resilience to tackle problems, including real-life problems;
- To make positive progress and attain to the best of their ability;
- To achieve fluency in order to free up their working memory and develop conceptual and procedural understanding;
- To be able to tackle increasingly complex problems and
- To be able to reason and problem solve mathematically.

Implementation

At Arunside, we follow a spiral curriculum approach. There is a significant body of literature which has proved that the spiral curriculum has been linked to improved learning outcomes. This approach to teaching enables children to:

- Consolidate and master their learning before moving on;
- Practise and develop ideas that they may not have previously learnt or mastered sufficiently;
- Meet new learning that increases in complexity and
- Make connections between prior and new learning.

Maths is taught every day at Arunside. In maths from Years 1-6, you will see the following:

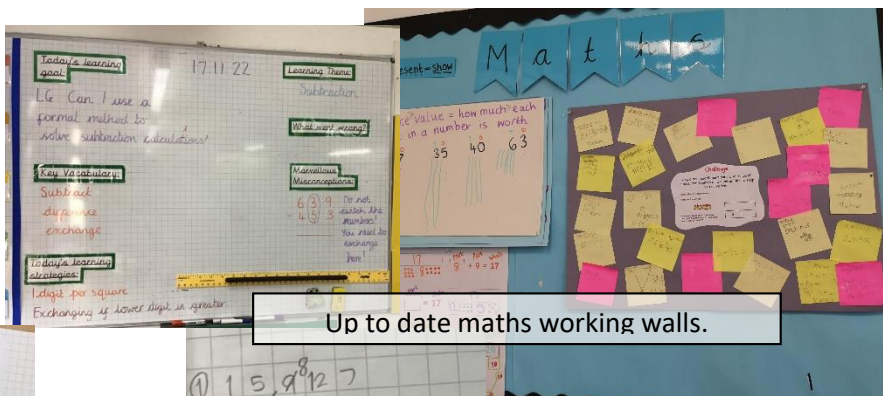
- **A 'Tough Ten'.** This is a short practice of 10 questions allowing children to develop their confidence in answering fluency-based maths questions to support success in arithmetic, reasoning and problem solving;
- **Prior learning being revisited.** This is triggered with a recap from the previous lesson or, at the start of a new topic, learning from the previous year group.
- **Learning goals made explicit at the beginning of every lesson.** Teachers use the National Curriculum to ensure appropriate coverage. They have access to support materials, such as White Rose, to support with small step learning and resourcing.
- **Vocabulary introduced and displayed on lesson slides and working walls.** Teachers will use this vocabulary in their questioning and in their modelling. Adults will encourage children to use this vocabulary in their verbal and written responses and discussions.
- **Mathematics working walls being used explicitly.** The aim is to provide children with worked examples of what they are currently learning, as well as any relevant vocabulary.
- **Challenge for all.** All children are encouraged to review their understanding throughout a lesson and choose an appropriate challenge for themselves.
- **New topics beginning with a core focus on fluency.** Children will be taught key number facts, procedures, concepts, principles and rules. Problems will be presented in a varied way (such as through standard and non-standard representations and varying contexts). Quick learners are challenged through varied problems, often presented in a non-standard way in order to encourage flexible thinking.
- **Concepts will be represented concretely, pictorially and abstractly to give deep mathematical understanding and provide inclusivity.** Children will be encouraged to move flexibly between these representations and use these to 'see' their mathematics in order to build conceptual understanding.

Quick learners will be encouraged to use these representations to think in a creative and joined-up way.

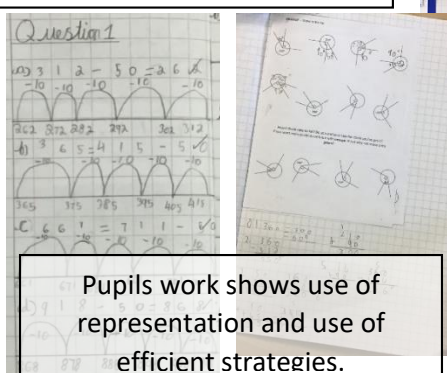
- **Reasoning taught explicitly.** Once children have mastered fluency, children are given opportunities to make generalisations, develop an argument, justification or proof using accurate mathematical language. Teachers have access to '*Deepening Understanding*' and '*iSee Reasoning*' to support with resourcing and/or creating their own reasoning-style questions.
- **Problem solving being taught explicitly.** Once children have mastered fluency, children are taught to break down problems into smaller steps and encouraged to persevere. Children are presented with a variety of routine and non-routine problems.
- **Misconceptions being addressed and used as a tool for learning.** We called these 'marvellous misconceptions' and these will be displayed on our working walls. These give children an opportunity to reason mathematically, develop arguments, justify their decisions and compare efficiency of different strategies.
- **Children working independently.** This gives children the opportunity to practise, apply and master their new understanding. Questions will progress from familiar strategies onto non-routine questions.
- **Children working in groups and in pairs.** Children are given the opportunity to explore possible solutions and articulate their understanding.
- **Extension challenges provided.** These provide quick graspers to further apply, deepen and extend their understanding, through rich and sophisticated problems, rather than accelerating onto new content.
- **Teachers and teaching assistants working with (groups of) children.** Our teaching staff are used to provide targeted support or challenge to those children who need it most. Support will be in the form of scaffolding, reframing of questions, repetition of lesson content or, in the case of case of quick learners, challenge through questioning and/or modelling.
- **Mixed ability seating as much as possible.** Expectations are high for all our children. You will see our children demonstrating high levels of confidence and engagement, as well as collaboration. Within class attainment seating maybe used on an occasional basis as a strategy of adapted teaching to meet the needs of groups of learners [EEF, 2021].
- **Struggling learners being supported either within or after lessons.** Each class has a teaching assistant who may be deployed either within or after lessons to support children who have not sufficiently mastered an area of learning. If, after this intervention, learning is still not mastered, class teachers will ensure that this concept is either revisited in the next lesson or, if the learning permits, in future lessons.
- **Home learning, on our online platforms 'MyMaths' and 'Times Tables Rockstars', is set meaningfully.** All tasks are related to the work completed in class [EEF, 2021] and homework club is available twice a week to support children in Year 6 in preparation for their transition to secondary school. Class teachers ensure homework is marked and timely feedback provided.



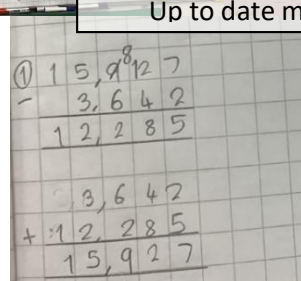
Children working collaboratively.



Up to date maths working walls.



Pupils work shows use of representation and use of efficient strategies.



Books show that children challenging themselves.

In maths in our Reception class, you will see the following:

- **A formal maths lesson.** This will be taught whole class, delivered by a class teacher and supported by teaching assistants. Class teachers use Development Matters as a reference tool.
- **Explicit mathematical continuous provision.** For example, you may see an adult-led mathematical game such as snakes and ladders or adult-led CP activity at the tables.
- **Continuous provision which involves non-explicit mathematical opportunities.** For example, you may see children learning about measurement through water play, reinforcing their problem solving skills or creating patterns using Lego bricks or singing mathematical songs and rhymes.
- **Rich mathematical learning environment.** As well as opportunities for maths through play, we have a maths display in both classrooms which is used by teachers to support number and place value. Physical maths resources are available for children throughout the day and children are taught how to use these correctly in lessons, as well as encouraged to explore them in free play.



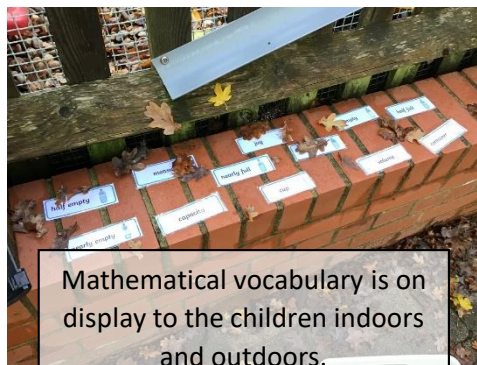
Physical maths resources available and used by the children.



Number washing line to support number recognition, formation and sequencing.



Mathematics learning display supporting place value- counting and number recognition.



Mathematical vocabulary is on display to the children indoors and outdoors.



Rich mathematical environment is extended to the outdoor area.



The children have practical opportunities to apply new learning indoors and outdoors during continuous provision.



Inclusion

The spiral curriculum approach has several key benefits for all our learners:

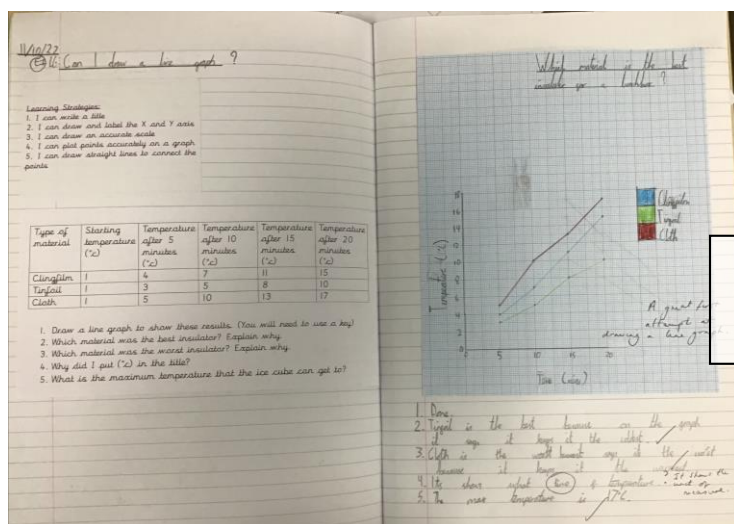
- Key information is reinforced and strengthened each time a child revisits a topic;
- The curriculum allows for logical progression of a topic from simplest ideas to more complex ones.
- Children are encouraged to apply their knowledge and make connections with their learning.
- Any children who requires additional support or challenge can be identified in the early phases of the spiral.

At Arunside, although it is our expectation that the vast majority of our children move through the content at broadly the same pace, we recognise that there is plenty of opportunity to cater for childrens' differing needs:

- We provide children with complex SEND with individual targets that are appropriate to support their learning;
- Children who find retaining or understanding new vocabulary, including children with EAL, are supported at a word, sentence and text level. Subject specific and subject-specialised words which may have alternative meaning (e.g. volume, mean, power) are introduced explicitly at the beginning of sessions and used throughout a topic. Adults model reading questions aloud, teach children to identify key words and cross out irrelevant information when modelling how to break questions down and encourage correct use of key vocabulary in verbal and written responses;
- Children who require additional time may be provided with intervention time, pre-teaching (in groups), worked examples on our working walls, scaffolded tasks which ensure focus is on the planned objective only and/or representations (including concrete) to support conceptual understanding;
- Children who find number fluency a challenge may be provided with concrete resources and visual supports, such as a multiplication grids, to remind them of number facts; opportunities at the start of a lesson to practise a required skill or encouraged to use online platforms, such as My Maths and Times Tables Rockstars, as part of their home learning;
- Literacy is supported in various ways such as providing learners with different resources, for example tinted paper exercise books or coloured overlays, use of concrete representations and visuals and strategic use of adult support and/or pairing a learner with a more confident peer.
- Teachers may use a variety of strategies to support children who struggle with attention and change such as: behaviour specific praise, incorporating a learner's interests into questions and giving a set number of questions to complete to name but a few;
- We provide additional support for struggling learners in the form of intervention groups for targeted groups of children. We use our Covid catch-up funding to run an intervention group, led by a qualified teacher, to support PPG children which involves pre-teaching or reinforcement of previous work. Our learning support assistants may also provide 1:1 precision teaching or pre-teaching for children with complex SEND outside the normal mathematics lesson.
- We are working with parents to support their children's learning at home. We are looking to develop our website with a growing suite of online tutorial videos to support parents and children with home learning. Parents in EYFS are provided with clear guidance on our school website as to how they can best support mathematical learning at home through cooking, routines and play.

Maths in the wider curriculum

- **Provide mathematical opportunities in other areas of the curriculum.** For example, in science, children measure forces in Newtons and statistics (such as bar charts) are used in geographical fieldwork. For example, in year 4, as part of their Geography of the local area study, mathematical data collection is used. In Year 2, the children use data collection as part of their science investigation into living things and their habitats.



Statistics in Science- Which material is the best insulator for a lunchbox?

- **Provide mathematical opportunities in clubs and internal and external competitions.** We have a STEM club where Year 3 children use data handling to work towards the CREST award and our ROAR club for Year 6s which had them looking at speed limits of emergency service vehicles when designing an emergency drone. The learning of times tables is promoted on Times Tables Rockstars in competitions such as 'England Rocks'. Children are also given the opportunity to represent Arunside at external mathematics competitions, such as the Christs Hospital Maths Competition and the A.I.M High Maths day at Heron Way.

Assessment

- On an everyday basis, teachers continuously monitor progress through regular marking of books, precise questioning and formative assessment such as independent work, weekly PiXL testing and times tables testing.
- Summative assessment takes place on a half-termly basis in Years 2-6 and question level analysis is used by teachers to identify gaps and plan to address these. It is the role of our Raising Standards Lead to monitor this.
- We use Insight as an assessment tracker, as well as a tool for identifying next steps for all children, including those working at below year group expectations.

Leadership, monitoring and review

The monitoring of the mathematics teaching and pupil progress is a shared responsibility of class teachers, the two mathematics subject leaders, Raising Standards Lead and the Senior Leadership Team.

- Teachers are provided with a Calculation Policy to ensure methods, language and represents are consistently used;
- Teachers have contributed towards a Long Term Plan for mathematics which serves a dual purpose: it enables class teachers to pace their curriculum as well as provide leaders with a snapshot of what is being taught and when;
- Staff are provided with CPD to ensure the they are using the most up-to-date strategies. Training is delivered either in the form of INSET days or staff meetings which are then disseminated to other members of staff in weekly Key Stage meetings. In 2023/24, Arunside will be taking part in the NCETM work group to continue to support.
- We conduct learning walks, book looks, pupil voice and teacher voice surveys in order to monitor what is going well and what we want to improve.

- Subject leaders attend maths network meetings, as well as the local leaders of mathematics education (LLME) meetings, with the aim to continuously improve the quality of teaching and learning at Arunside.
- The school's governing body receive regular updates to inform them of the plans to drive forward the teaching and learning of mathematics, as well as standards achieved to date.

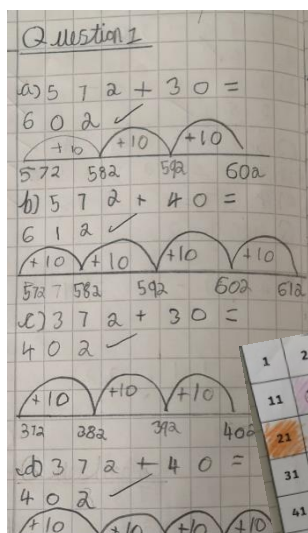
Development

We have two main focuses in mathematics at Arunside for the 2022/23 academic year:

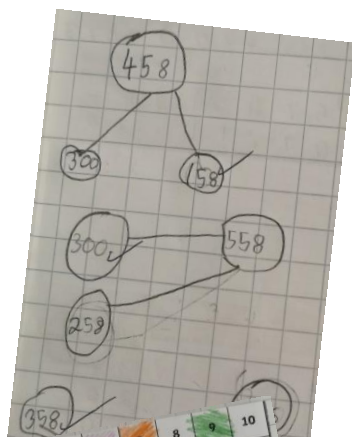
1. **To increase parental engagement by creating short video guides related to different areas of mathematics.** We want to promote the progress and outcomes for all learners but have a particular focus on children who are eligible for the Pupil Premium Grant. In addition to other factors, the Covid-19 pandemic has potentially reversed a decade of progress in closing the attainment gap for this group of learners [EEF, 2022]. By considering how we can tailor and be flexible with our school communication, such as through the creation of short video tutorials to support with home learning, we can increase parental engagement, provide a positive learning dialogue and ensure that a higher quality of home learning is being completed [EEF, 2021].
2. **To improve attainment and understanding in multiplication and division, by improving automatic recall of multiplication and division facts.** Our current results in mathematics show a particular weakness in multiplication and division and feedback from pupil voice shows that this is an area that the children are much less confident with. One of the main barriers to this is the recall of \times and \div facts [Ofsted, 2021; NCETM, 2017]. We will be implementing this through Times Tables Rockstars in classes as well as taking part in whole school and national competitions. Research has shown that children were 38% faster at answering times tables questions after using TTR than when they started using it [Shine, 2022]. We will also implement this by continuing to ensure quality first teaching by encouraging and supporting teachers to use resources from CPD from the 2021/22 academic year to support conceptual understanding [EEF, 2021].

Impact

Our books



Children use representations to support conceptual understanding.



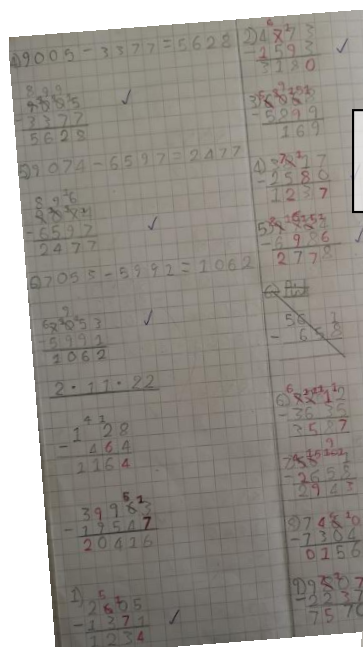
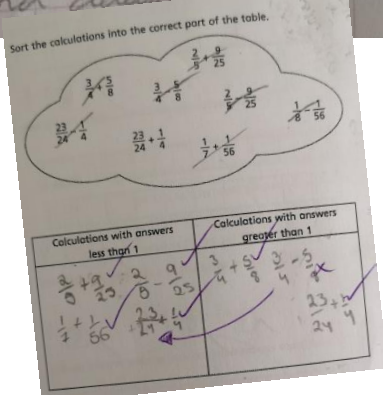
Children are beginning to spot mathematical patterns through use of variation and use these more challenging or unfamiliar problems.



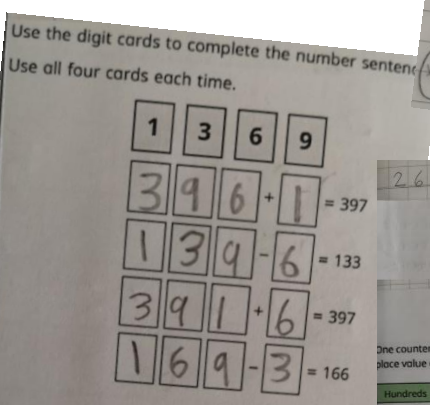
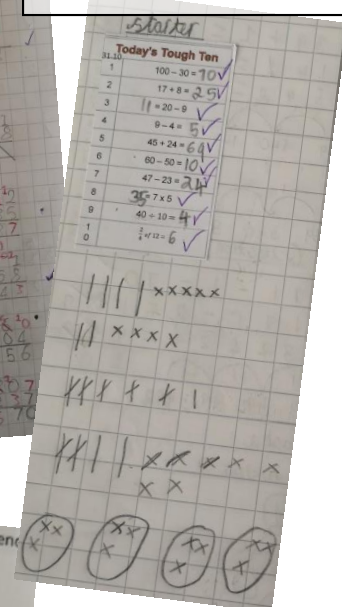
Our children are able to reason- they can argue and justify their answers. They are given opportunities to identify relationships.

Explain the mistake:

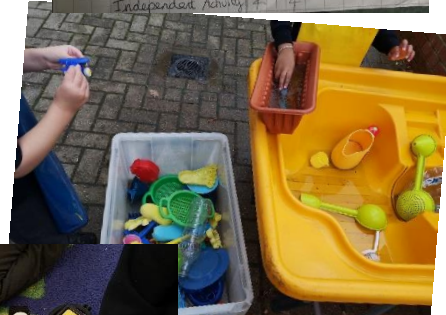
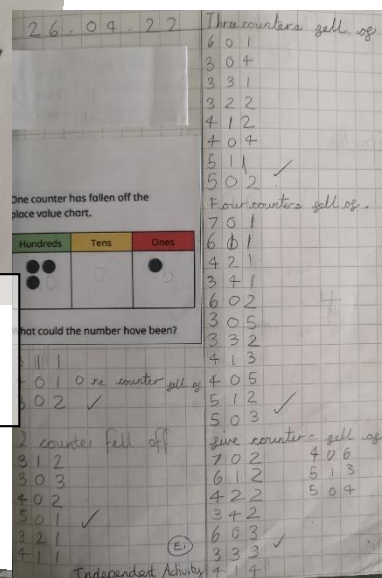
This person has added the denominators and the numerators together than finding a common denominator and adding the numerators.



Our children are strong in procedural fluency.



Our children are able to apply their fluency in problem solving.



In EYFS, children apply their mathematical knowledge in problem solving and free play. They use correct mathematical vocabulary.



We perform well in external competitions. In 2022, we came 6th in the Christs Hospital Mathematics Competition.



Maths is used effectively in our STEM Club when designing products.

Our data

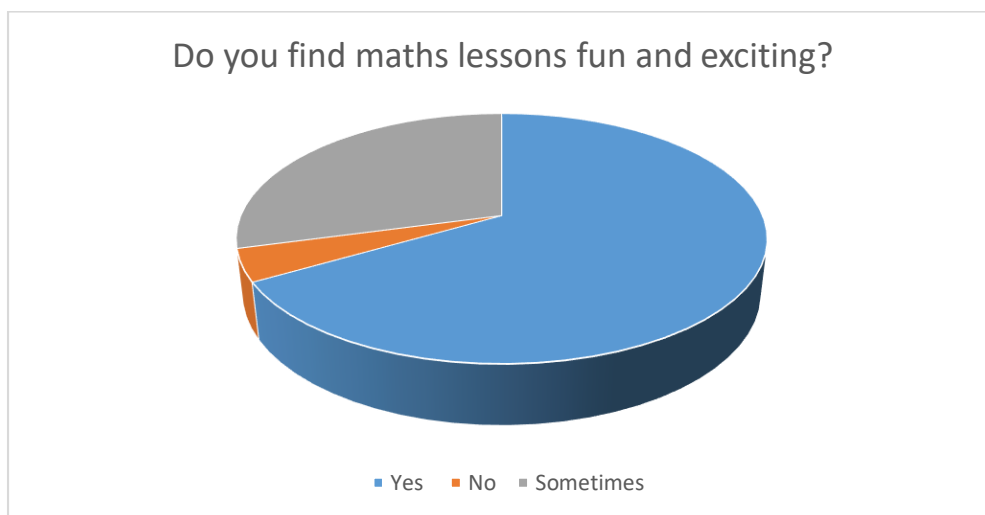
Pupil voice

Feedback from our Spring 2021 pupil voice:

- The children at Arunside enjoy Mathematics. Most said that they enjoyed arithmetic and children mentioned enjoying using practical resources as well as solving problems with more than one step.

"I enjoy problem solving when there are lots of different steps to follow."

"We get to do fun activities and lots of work to do."



- We asked the children how maths lessons could be better and the feedback from the children in KS1 was that they wanted more challenge, to work in groups and bring other subjects into their maths lessons e.g. music, cooking. For KS2, many children mentioned that they wanted to learn through games as well as using practical equipment in lessons. Several children also suggested that teaching others would be good, such as children from younger year groups.
- When asked what they do well in mathematics, many of the children mentioned that areas of arithmetic and what they do well in Maths the most. Across the school, children appear to be more confident with addition and subtraction, with only a few confident with multiplication and division. This is evident in QLA Pixl data.
- There were a variety of different areas of Maths that were chosen to be the most difficult, however, it seems that many children find multiplication and division the most difficult. The suggestions from some children were that they don't understand the methods or representations.

Across the school, we need to develop understanding and confidence in multiplication and division and the methods and representations that we use.

Feedback from our Autumn 2022 pupil voice:

- Do you enjoy maths?

"Maths is fun and new." – EYFS

"You get to learn new words." - EYFS

"Yes because I learn new things." – Year 1, Celandine.

"Maths is fun and even hard questions are easy for me." – Year 1, Bluebell.

"Yes I am good at it and it is fun." – Year 2, Hawthorn.

"I love maths. You learn lots of different strategies." – Year 3, Willow.

"Maths is fun and I like learning." – Year 3, Holly.

"Yes. I have learnt that mistakes are good because they show you tried." – Year 4, Hazel.

"It is my favourite subject because you get to use your brain." – Year 5, Oak.

- *What have you done today to help you with your learning?*

When talking to the children, they were able to explain the strategies that they had been using to support their learning. Children in KS1 explained that they had used number lines, part whole models, base ten, tens frames, dice and numicon. Children in KS2 described strategies that they had been using, such as column addition and subtraction.

- *How do you know you have been successful in your maths learning?*

Many of the children stated that success in their maths learning was having lots of ticks, neatly presented work and filling their maths page up. However, a child in year 4 was able to explain that mistakes are good because they show that you tried.

- *Have you used mathematics skills in any other subjects?*

Some children identified that they had used mathematics skills in science when drawing graphs. However, this was only in a small number of year groups and will therefore be an area of development. Staff need to ensure they are being more explicit when teaching mathematics skills across the curriculum.

Feedback from our Autumn 2022 staff survey:

- Most staff have reported that they are mostly confident with planning, teaching and assessing in maths.
- Staff identified the following as having the biggest impact on supporting struggling learners in mathematics:

“Practical resources and adult support.”

“Concrete materials, support from an adult, re-explaining in a different way, worked examples.”

“TA support, differentiated work, targeted support, group work.”

“Pick-up/ interventions in the afternoon.”

“Revisiting work, adult time or partner work.”

- Staff gave the following responses regarding marking:

“My marking is impactful as it informs my next steps and that my TA can pick up any misconceptions in the afternoon and immediately improve outcomes.”

“Distance marking is used to inform next steps or adapt the next lesson to address misconceptions.”

“Children respond positively to marking and like to see that their teacher has seen their work.”