# What to look for in our **Maths — No Problem!** mastery approach

## Nothing decorative, everything deliberate

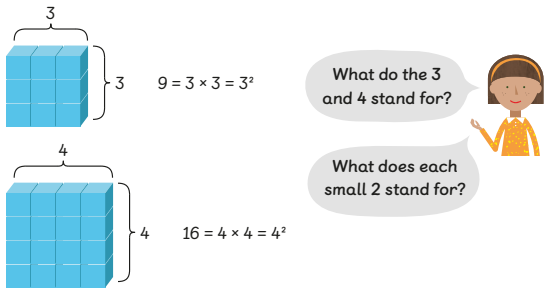
Everything in the **Maths — No Problem!** resources, from language, numbers, fonts, colours and page layout have all been chosen to not only maximise clarity, but to also minimise clutter, confusion, and distraction. They have all been selected to give every pupil the opportunity for a deep conceptual understanding of maths.

## Language

Our use of language is consistent across all Primary Years. It is important to use age-appropriate language that still includes mathematical terminology from Year 1, when pupils are learning their foundation skills. All resources have been designed to introduce terms at the appropriate point and not expose learners to unnecessary jargon.

However, if language is introduced too early or incorrect terminology is used, this could very easily lead to confusion and distraction in the classroom, and a lot of misconceptions. Even though Primary learners are young they are still discovering abstract and complex concepts, so we need both our written and spoken language to complement this learning process if they are to be successful.

The example below shows how square numbers are introduced in Year 5. The geometric image very clearly shows where this concept derives from. Next to it we can see that the square of a number is a mathematical symbol and what that means in terms of multiplication, which is a skill Year 5 pupils will already be familiar with.




*Textbook 5A — Chapter 3 — Lesson 6*

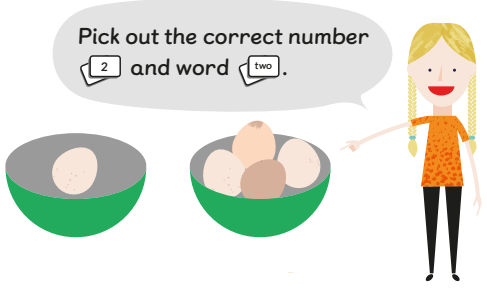
## Design

The books have been created to support both the learner and teacher, and we wanted all aspects of the design to reflect this. For example, our bespoke font, Castledown, imitates how children learn to print, which connects their own writing with the text in the book. This improves their ability to understand and communicate the ideas they are learning. Additionally our colour scheme was designed very deliberately with colour blindness in mind, so they are accessible to all pupils.

Throughout the **Maths — No Problem!** books, all imagery has a reason to be there ranging from strengthening pupils' visualisation skills, to supporting children still learning to read, to keeping learners' attention. It has been deliberately included to reinforce the language used, whether this is new terminology or to illustrate instructions and examples.

We have been mindful not to include any design features that do not serve a purpose and could result in distraction, which we know can happen quite easily in a classroom. Our designers did a lot of research outside the world of education, and took inspiration for the look and feel of the books from many different mediums, such as computer games, apps, adverts and story books, to keep children's attention.

In the example below, pupils must count how many eggs there are in each bowl and Hannah is encouraging them to choose the correct number and word. However, at this point in Year 1, some learners may still not be confident reading or with this terminology, so examples have been included in her speech bubble next to the respective term so children can make this connection themselves.




*Textbook 1A — Chapter 1 — Lesson 3*

## Layout

Each part of the **Maths — No Problem!** lesson structure has a specific role to encourage learning to a greater depth. It is partly based on Dienes' theory of the stages of learning, where he discusses that for pupils to have a strong understanding of a topic the initial learning should be playful and informal before moving on to a structured and more formal learning. This is mirrored by the **Maths — No Problem! In Focus**, where pupils are encouraged to explore the anchor task for themselves, followed by the **Let's Learn** section of the textbook, where the teacher can lead a class discussion looking at all the different investigations.

The textbook often exhibits many different methods for solving the same problems, so learners are able to find out what works best for them. We believe at **Maths — No Problem!** that if pupils are able to discover the solutions for themselves, they will be able to establish connections between the topics and have a better conceptual understanding. The textbook has also been designed, in part, as a journal, so pupils are exposed to clear and concise ways of explaining their ideas, giving them inspiration when they come to write their own maths journals.

The lesson structure is consistent throughout all year groups and creates a routine that pupils are familiar with, we believe this promotes collaboration, confidence and independence in young pupils.

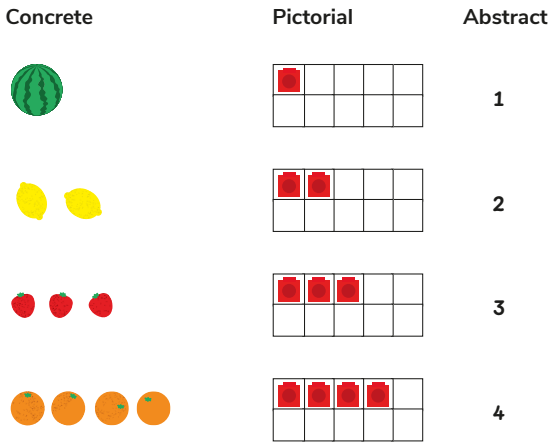
## Examples

All activities are age appropriate and have been designed with whole class teaching in mind. The anchor tasks have been created to be accessible to every learner: not only supporting those struggling but easily adapted to extend and engage advanced learners within the lesson, without accelerating them onto new topics or curriculum for older pupils. Our aim is to nurture better thinkers, who can discuss the problems and topics at a greater depth because they have a solid, conceptual understanding of the mathematics.

The questions, not only within the Guided Practice section of the textbook but also the independent workbook, have been devised with variation in mind. The numbers used are all planned so one element is changed each time to scaffold learning, this means pupils are given the opportunity to develop a conceptual understanding of the topic, rather than simply relying on a procedure.

## Concrete, Pictorial, Abstract approach

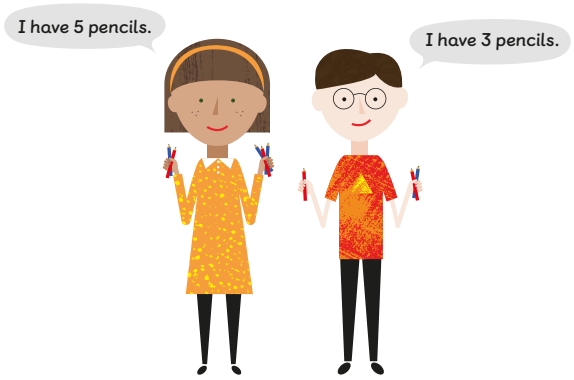
Jerome Bruner's Concrete, Pictorial, Abstract (CPA) approach is a learning theory that lies at the heart of **Maths — No Problem!**. This approach builds on learner's existing knowledge by introducing abstract concepts in a concrete and tangible way. It is a progression that supports pupils when they are learning new ideas, starting with the 'doing' stage that uses concrete manipulatives, real-life examples or activities to allow learners to discover the mathematical concepts for themselves.




*Textbook 1A — Chapter 1 — Lesson 2*

All anchor tasks in the **Maths — No Problem!** textbooks are real-life problems so they are relatable and interesting to the specific age range.

Additionally, both the textbooks and online teacher guide show concrete resources that could aid struggling learners in each particular lesson, this imagery can also encourage pupils to independently help themselves.

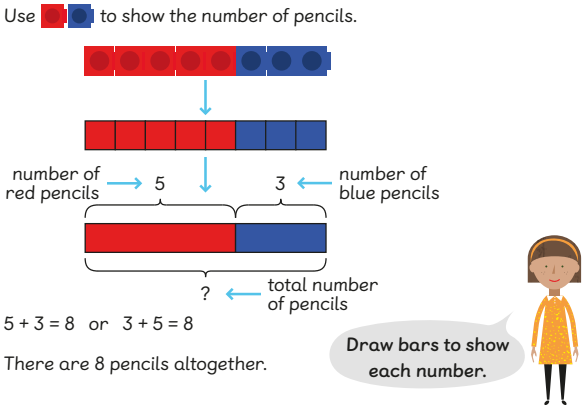



*Textbook 3A — Chapter 2 — Lesson 20*

The combination of the **Maths — No Problem!** lesson structure and concrete activities mean pupils are learning informally through exploration and experimenting to discover their own coding system rather than being told it by an adult.

We then move to the Pictorial 'seeing' stage, where learners are given visuals or they can draw diagrams to represent the same ideas. In this stage, learners should be encouraged to visualise the concrete objects or real-life examples and make connections with the pictorial representations.

Seeing and then eventually drawing models allows learners to move to the abstract 'symbolic' stage. Here learners have a solid understanding of the concrete and pictorial stages of the problem, strong visualisation skills and can now access abstract mathematical concepts and use symbols to model problems.



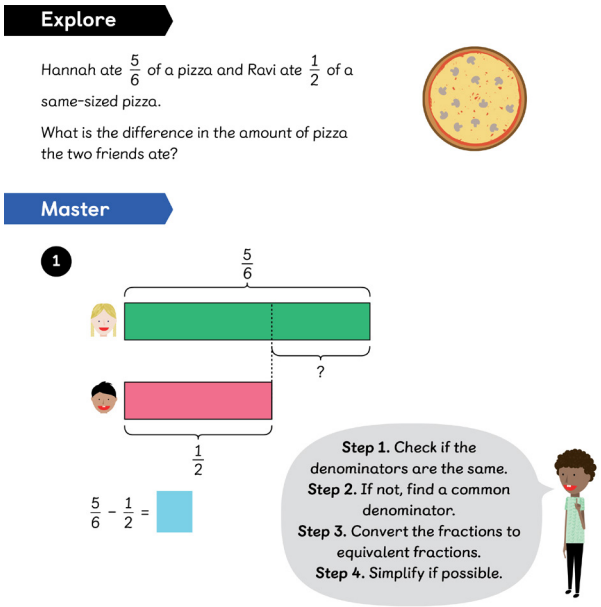

*Textbook 3A — Chapter 2 — Lesson 20*

Throughout the **Maths — No Problem!** Series, tools have been included to progress pupils through Bruner's CPA approach. The design of each individual tool is consistent from Years 1 to 6, meaning children feel confident using them when learning a new concept and they are seen as reliable even when starting a new academic year. It is important for the design of the tools to be versatile so they can be adapted to represent a variety of concepts throughout an academic education. Number lines, for example, are a simple tool that can be used to show a wide variety of things: adding, subtracting, calculations with multiple numbers, comparing numbers, spotting patterns, multiplication, rounding numbers and even fractions. They really do represent the idea that numbers are infinite.

These qualities also make the included tools great to scaffold learning, as they are not only literal representations but they can start to develop advanced skills. For example, ten frames are introduced when pupils are learning to count, but they develop good habits for later calculations like finding tens when adding or subtracting.

It is important to **Maths — No Problem!**, that our tools are as clear and concise as possible. They should help learning, not hinder it. The bar model is a great example, throughout the books it is consistently used to represent a multitude of different problems. It is there to translate the question, so it is visually clearer to learners what the answer is or how to get there. It is a 'pictorial' stepping stone to 'symbolic' algebra.

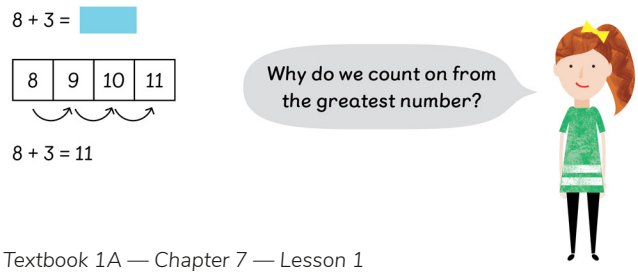
Take a look at the tricky word problem below from Year 5. Some learners may struggle to translate this question and work out what they actually have to do. The bar model is a simple representation of this word problem, and shows the reason why we must subtract the two fractions is because the difference between the two weights is 5/12 kg.




*Textbook 5A — Chapter 6 — Lesson 13*

Also, our gang of characters all have their roles: either to guide learning, expose misconceptions or prompt discussions. They grow and develop alongside pupils. Vygotsky talks about the need for collaboration and interaction during learning, as children learn and challenge each other. The **Maths — No Problem!** characters are learning companions, there to guide and share their experience. They are included in the textbooks as a tool to help teachers teach.

Here Holly is prompting Year 1 pupils to think about why they always count on from the greatest number. Learners are constantly being exposed to what the **Maths — No Problem!** characters are thinking, which has been designed to model the metacognitive skills we want pupils to develop.




*Textbook 1A — Chapter 7 — Lesson 1*