Teaching for Mastery in Mathematics at St Anselm's

Aims of the Workshop

- To understand what Teaching for Mastery looks like.
- To understand what a Maths teaching sequence looks like.
- To familiarise with resources used to support learning.
- To understand the how the CPA approach supports reasoning and problem solving.

What is Mastery?

If you drive a car, imagine the process you went through…

•The very first drive, lacking the knowledge of what to do to get moving

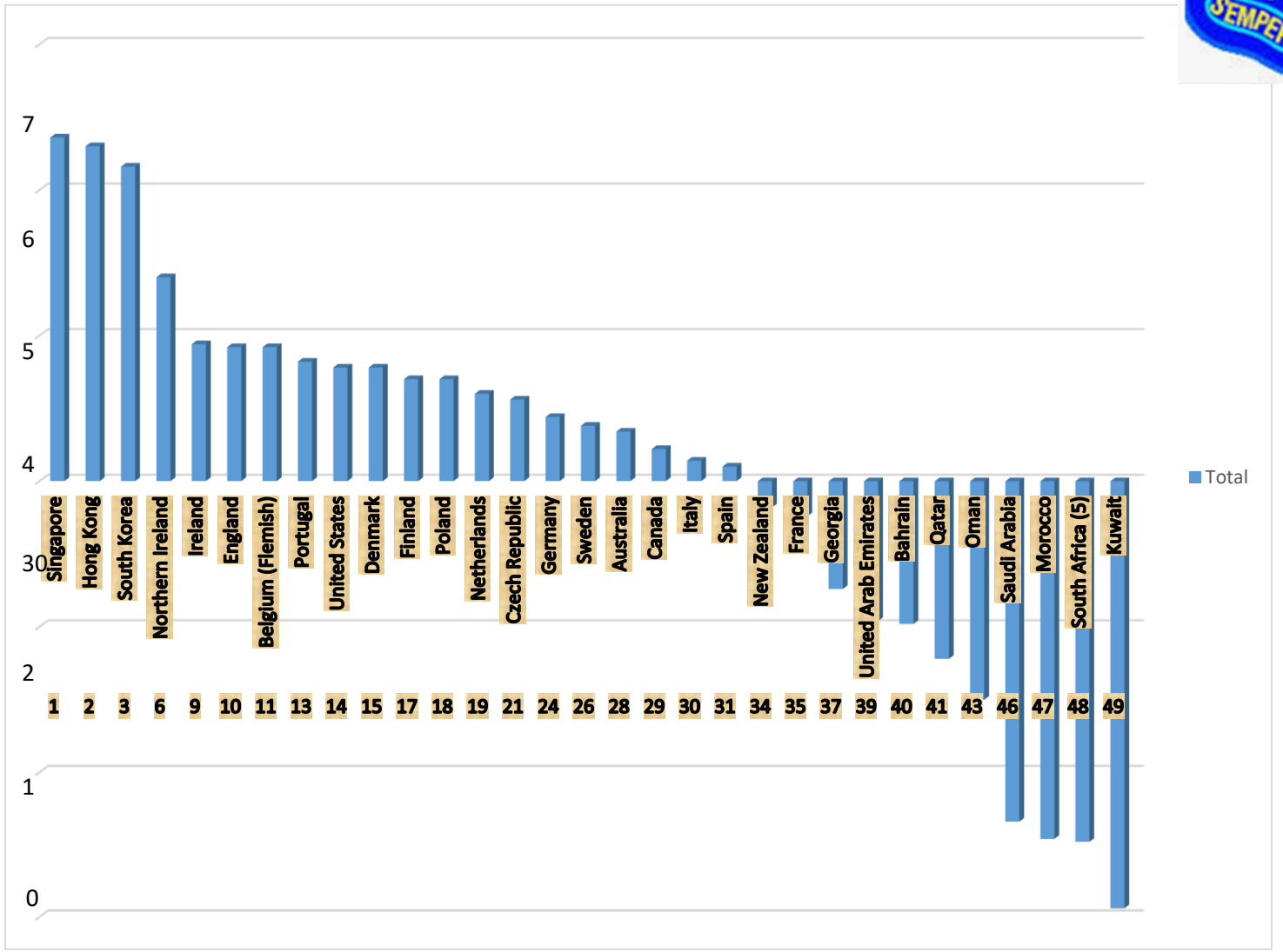
- The practice, gaining confidence that you are able to drive
- The driving test, fairly competent but maybe not fully confident
- A few years on, it's automatic, you don't have to think about how to change gears or use the brake
- Later still, you could teach someone else how to drive

What is Mastery?

- An expectation that all pupils can and will achieve.
- The large majority of pupils progress through the curriculum content at the same pace. Differentiation emphasises deep knowledge and individual support/intervention.
- Maths is taught through units of work that focus in depth on key topics. Lessons and resources are crafted carefully to foster deep conceptual and procedural knowledge.
- Practise and consolidation play a central role.
- Teachers use precise questioning to check conceptual and procedural knowledge.
- Children are not set in any particular group depending on ability, teachers assess in lessons to identify who requires intervention that day, so that all pupils keep up.

Where does Teaching for Mastery come from?

Teaching for Mastery originates in Asia in places such as Shanghai and Singapore.

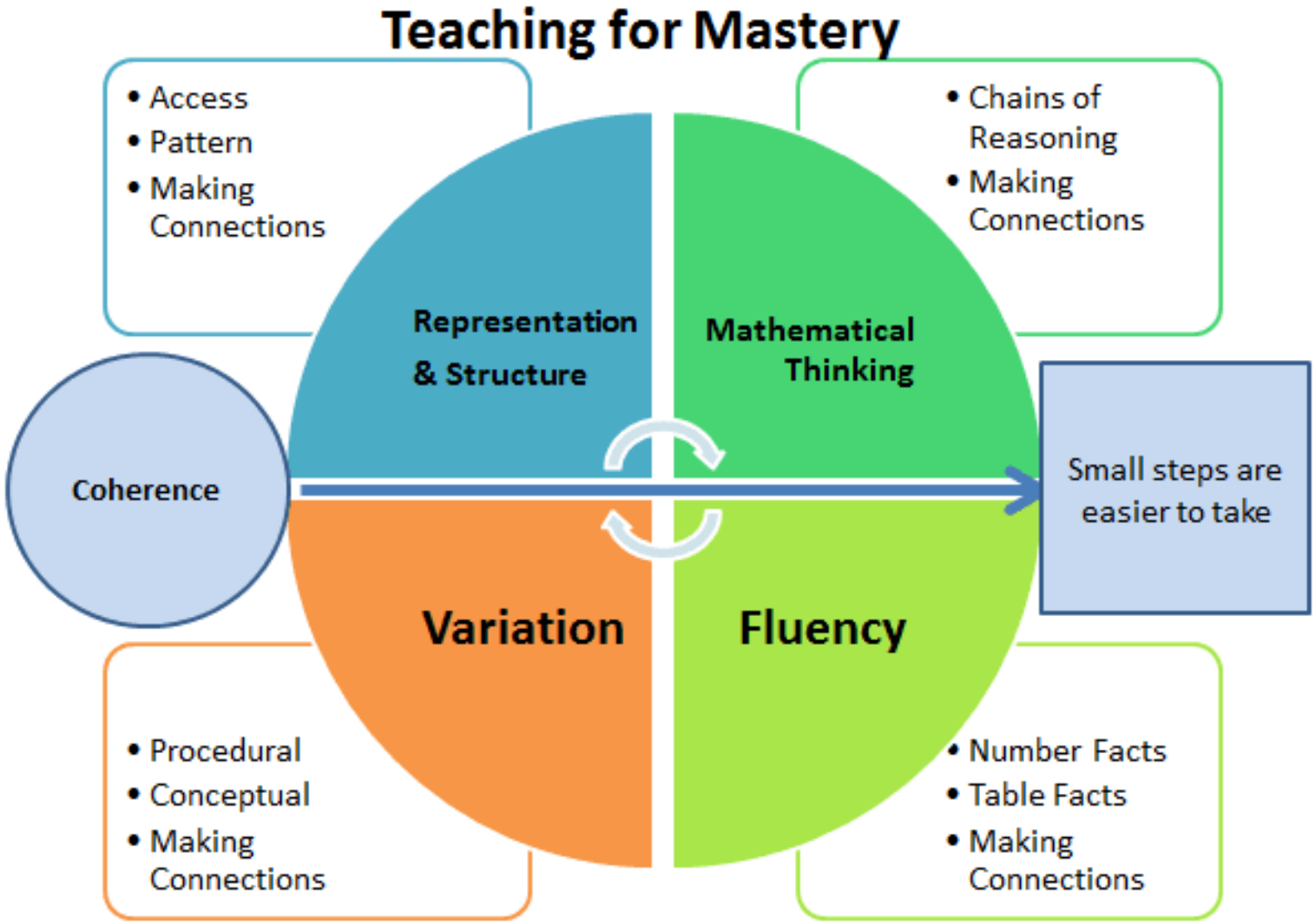


The approach to teaching maths in high performing jurisdictions such as Shanghai and Singapore is based on a few fundamentals:

- Problem solving curriculum
- Emphasis a practical approach to problem solving
- Emphasis on conceptual understanding
- Systematic development of skills and concepts
- **Emphasis on the C - P - A approach**

Ministry of Education of Singapore (2006) *Mathematics Syllabus (Primary)* Singapore: Curriculum Planning and Development Division

The 5 BIG ideas of Teaching for Mastery



NCETM – National Centre for Excellent in the Teaching of Mathematics believe that mastering maths means acquiring a deep, long-term, secure and adaptable understanding of the subject.

Teaching in Action:
https://www.ncetm.org.uk/resources/48209

What is the CPA approach?

- The CPA approach builds on children's existing knowledge by introducing abstract concepts in a concrete and tangible way.
- It involves moving from concrete materials, to pictorial representations, to abstract symbols and problems.
- With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.

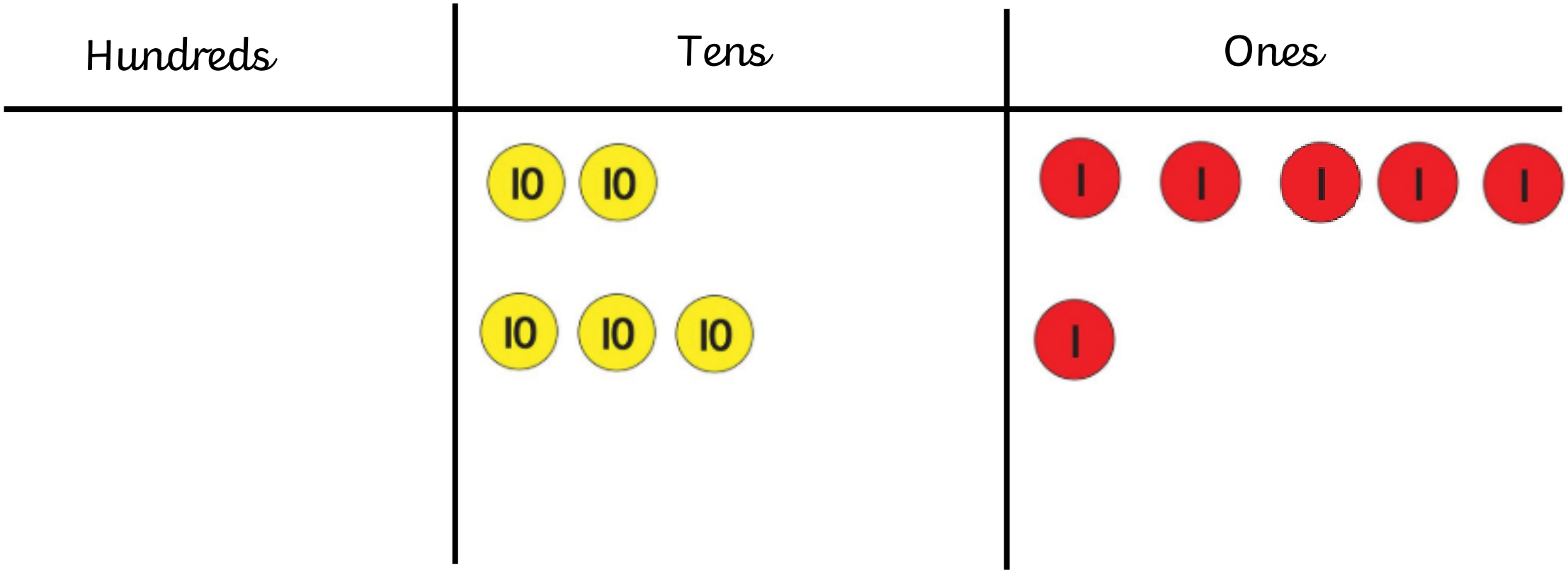
Concrete

- Concrete is the "doing" stage.
- During this stage, students use concrete objects to model problems.
- The CPA approach brings concepts to life by allowing children to experience and handle physical (concrete) objects.
- With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.

How many ways can you represent the number **24** using the concrete resources on your tables?

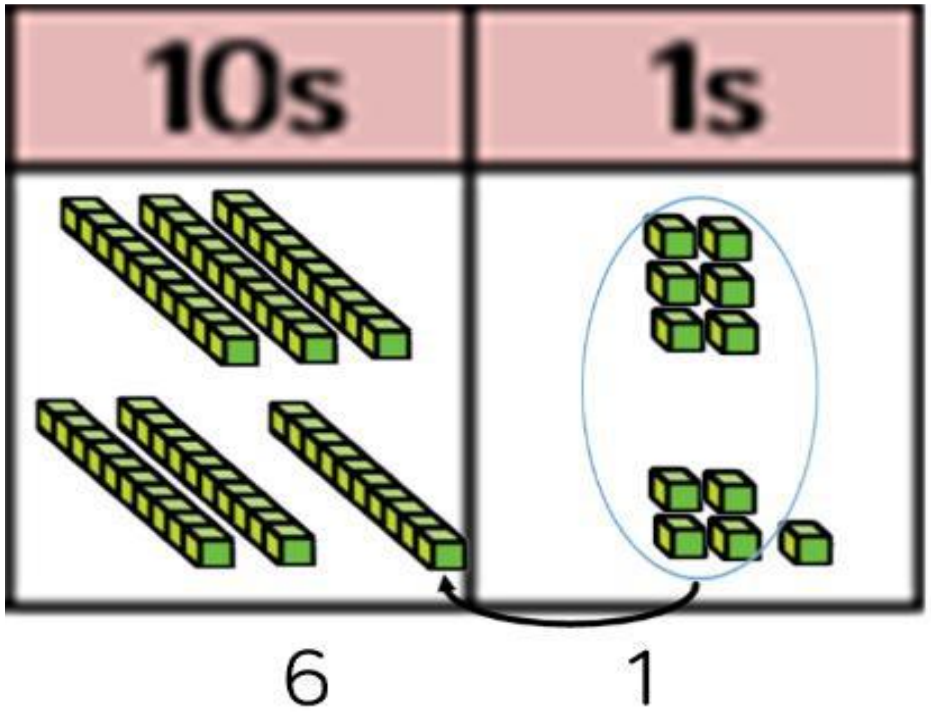
Concrete

Can you represent the following calculation using the place value counters? **25 + 31 =**



Concrete

Can you represent the following calculation using the dienes? **36 + 25 =**



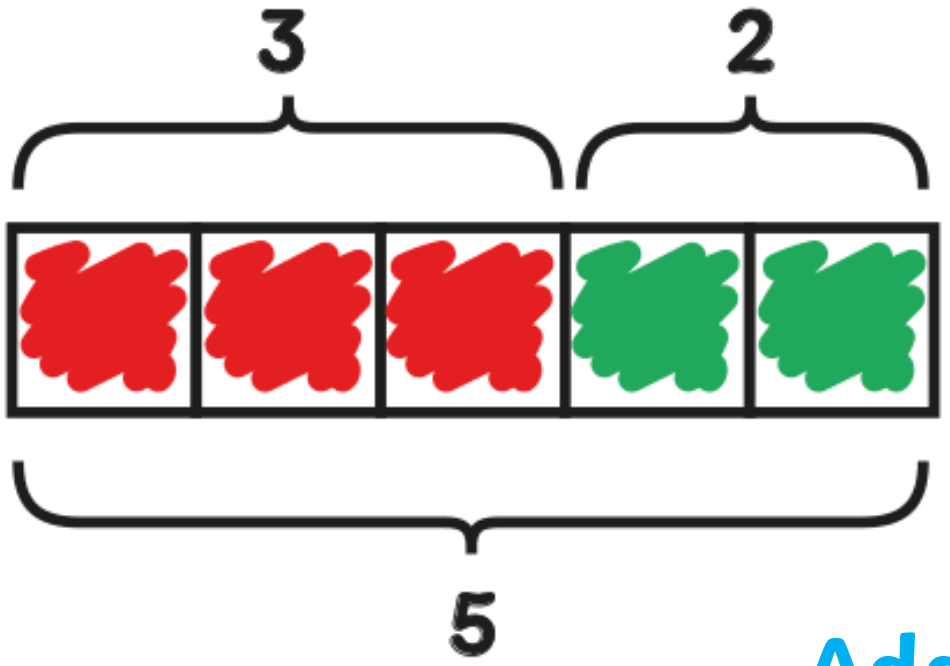
As we use a base 10 system, we know that we cannot have more than 9 ones in the ones column. 'We have to exchange our 10 ones for 1 ten.'

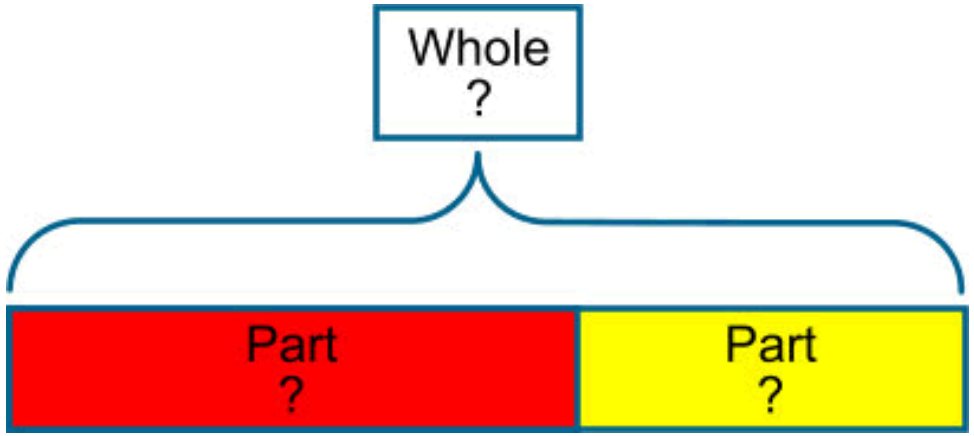
Pictorial

- Pictorial is the "seeing" stage.
- Here, visual representations of concrete objects are used to model problems.
- This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.
- There are many ways that children can represent their understanding pictorially including; the bar model, the part-part whole model, drawing concrete resources, using a number line etc.

Pictorial

At St Anselm's, we encourage children to use bar models to represent their understanding pictorially.

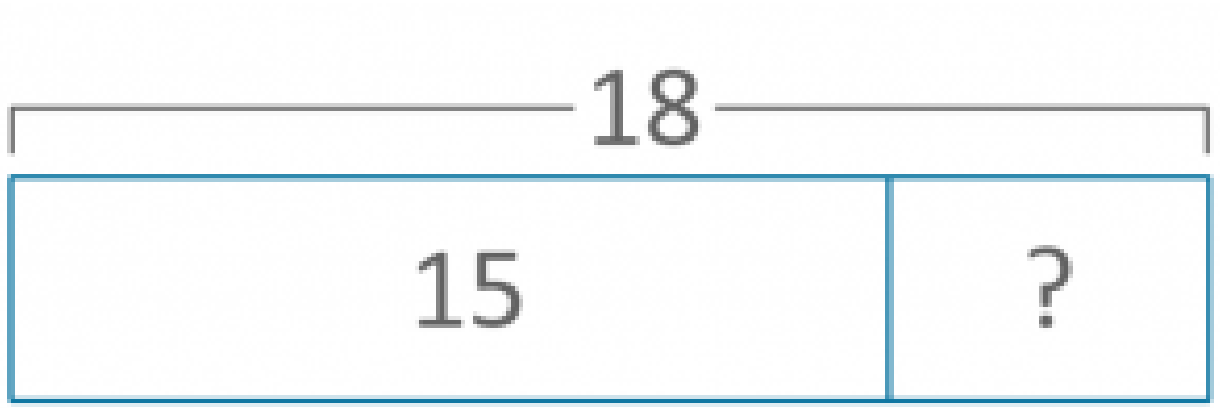




Addition: part + part = whole

Pictorial

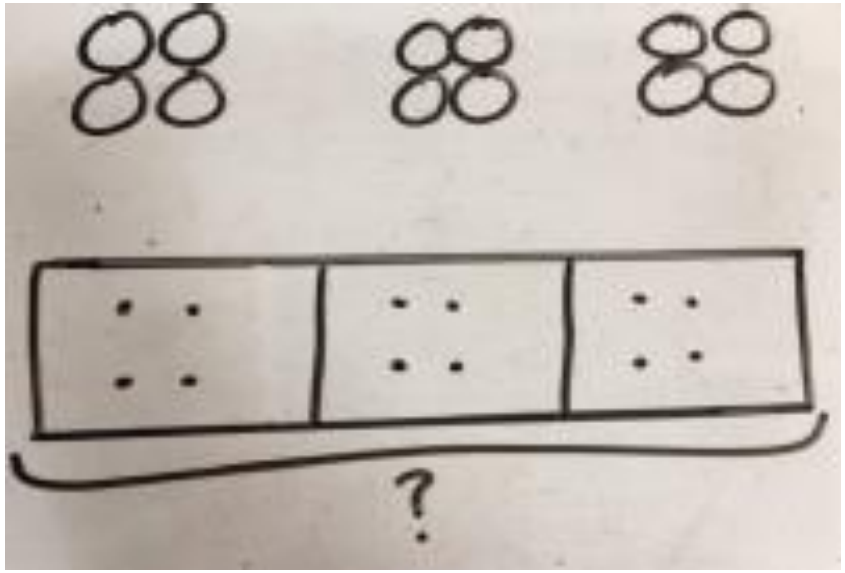
At St Anselm's, we encourage children to use bar models to represent their understanding pictorially.



Subtraction: whole – part = part

Pictorial

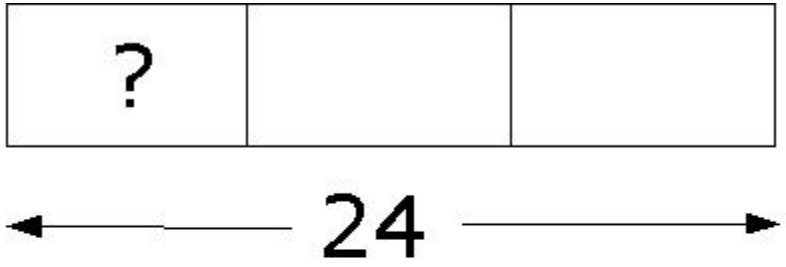
At St Anselm's, we encourage children to use bar models to represent their understanding pictorially.



Multiplication: part + part + part = whole

Pictorial

At St Anselm's, we encourage children to use bar models to represent their understanding pictorially.



$24 \div 3 = ?$

Division: whole ÷ amount of parts = part.

Bar Modelling

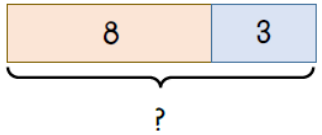
On your table, there are some problems to solve using the bar model.

On whiteboards, can you have a go at solving these!

1 There are 8 bees in a hive.

3 more bees enter the hive.

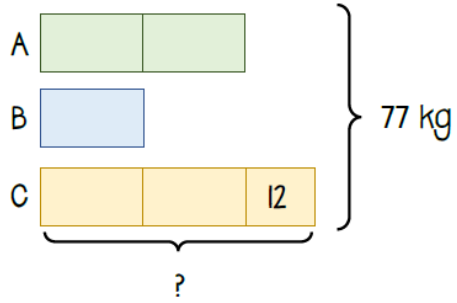
How many bees are now in the hive?



2 Asif has 3 boxes.

- Box A weighs twice as much as box B
- Box C weighs 12 kg more than box A
- The total weight of all 3 boxes is 77 kg.

How much does box C weigh?

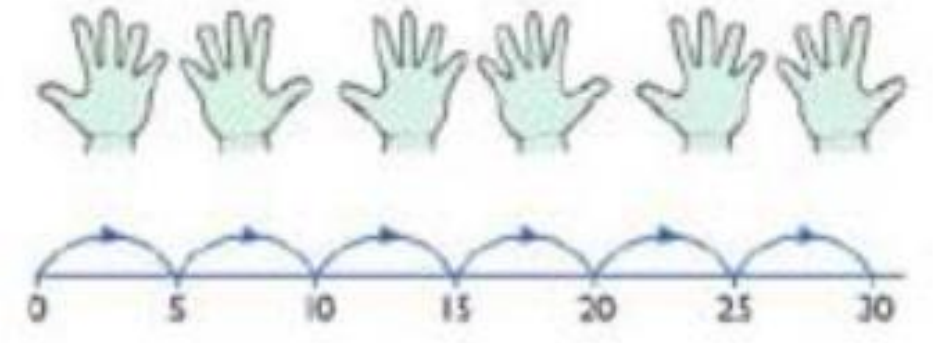


Abstract

- Children use abstract symbols to model problems.
- Students will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem.
- The abstract stage involves the teacher introducing abstract concepts (for example, mathematical symbols).
- Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols (for example, +, −, x, /) to indicate addition, multiplication or division.

CPA – Counting in multiples.

Concrete
Count in multiples supported by concrete objects in equal groups.



Pictorial
Use a number line or pictures to continue support in counting in multiples.

5, 10, 15, 20, 25 , 30

Abstract
Count in multiples of a number aloud.
Write sequences with multiples of numbers.
Fill in missing numbers in a sequence.

Feedback from Children

Short Division in Year 5

4812÷4 =

Concrete → Pictorial → Abstract

Questions?

Useful websites to find out more!

- https://www.ncetm.org.uk/resources/47230
- https://whiterosemaths.com/
- https://www.tes.com/teaching-resources/teaching-for-mastery-in-primary-maths
- https://mathsnoproblem.com/en/mastery/what-is-maths-mastery/