

# Mathematics at Rivergums PS: Concrete, Pictorial and Abstract (CPA)



At Rivergums Primary School we have started to change the way we teach Mathematics to better support our students and help them to be more confident problem solvers. We have started to implement an approach called 'Concrete, Pictorial, Abstract' also known as CPA. Children and adults can find maths difficult because it is abstract. The CPA approach helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way. The approach originally began in Singapore and has seen Singapore rise to be the top performing country in the world for Mathematics.

## Concrete

Concrete is the "doing" stage, using concrete objects to model problems. The CPA approach brings concepts to life by allowing children to experience and handle physical objects themselves. The teacher begins instruction by modelling each mathematical concept with concrete materials. Every new abstract concept is learned first with a "concrete" or physical experience.

Concrete - handling real objects

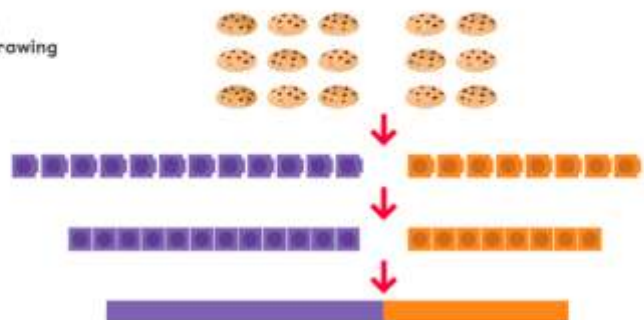


How many more cubes do they need to make a stack of 10 cubes?

Reference: Maths - No Problem! Primary Maths Series Textbook 1B, page 24

### BAR MODELLING

Concrete to pictorial - drawing



For example, if a problem is about adding up four baskets of fruit, the children might first handle actual fruit, counters, toys or cubes before progressing to using a picture or diagram to assist their problem solving.

## Pictorial

Pictorial is the "seeing" stage, using representations of the objects to model problems. This stage encourages children to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem.

Building or drawing a model makes it easier for children to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.


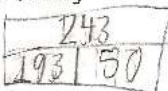
## Abstract

Abstract is the "symbolic" stage, where children are able to use abstract symbols to model problems.

Only once a child has demonstrated that they have a solid understanding of the "concrete" and "pictorial" representations of the problem, the teacher introduces the more "abstract" concept, such as 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.

Although this information for our parents presented CPA as three distinct stages, our skilled teachers will go back and forth between each representation to reinforce concepts and assist children at all levels.

Our approach encourages teachers to vary the concrete materials and pictorial methods the children use in class, for example, one day they might use counters, another day they might use a ten frame. Children are encouraged to represent math's problems in a variety of ways, for example, drawing an array, a number bond diagram or a bar model. By systematically varying the strategies and methods they use to solve a problem, we help children to make quicker mental connections between the concrete, pictorial and abstract phases.

Jimmy had 116 feathers and then he bought 198 more. How many does he have now?	
Number Sentence $116 + 198 = 314$	Working out $\begin{array}{r} 116 \\ +198 \\ \hline 314 \end{array}$
Model Drawing 	Word Problem - Using the same numbers Do had 198 dogs and osar had 116 how many do they have in totle?
Liz had \$243 and Isaac had \$193. How much more did Liz have than Isaac?	
Number Sentence $243 - 193 = 50$	Working out $\begin{array}{r} 243 \\ -193 \\ \hline 50 \end{array}$
Model Drawing 	Word Problem - Using the same numbers Liz has 243 dollars and Isaac has 193 dollars how much more does Liz have?

Throughout the year we will be offering some parent workshops to assist parents in learning the strategies and models used in CPA. More information will be sent about this in Term 2.

Mrs Kerryn Woodhouse, Curriculum and Innovation Associate Principal.