



REGENTS INTERNATIONAL SCHOOL  
PATTAYA

A NORD ANGLIA EDUCATION SCHOOL

# MATHS AT REGENTS

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# INTRODUCTION

- 1. Introduction: Maths at Regents
  - 2. What is Maths Mastery?
  - 3. Maths Mastery Approach: Lesson design & Maths in the Classroom
  - 4. White Rose Scheme
  - 5. Concrete, Abstract and Pictorial Approach
  - 6. Models & images
  - 7. Bar Modelling
- 
- Questions!

# MATHS AT REGENTS



# WHAT IS MATHS MASTERY?

The underpinning principles of the Maths Mastery Approach:

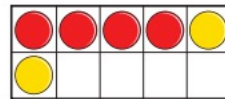
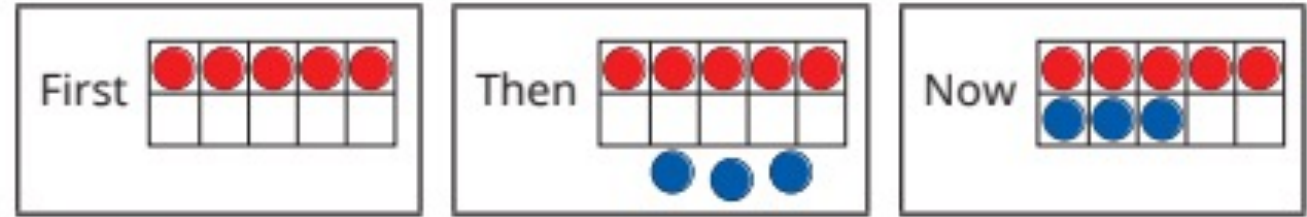
- Maths teaching assumes everyone **can** learn and enjoy mathematics.
- Mathematical learning behaviours are developed such that pupils focus and engage fully as learners who reason and seek to make connections.
- Teachers continually develop specialist knowledge for teaching mathematics, working collaboratively to refine and improve teaching.
- Curriculum design ensures coherent and detailed sequence of essential content to support sustained progression over time.

# MATHS MASTERY: LESSON DESIGN & MATHS IN THE CLASSROOM

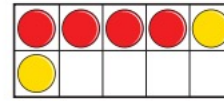
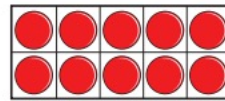
Year 1 | Spring term | Block 2 – Addition and subtraction (within 20)

## Small steps

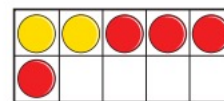
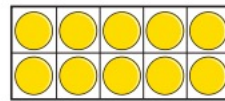
- Step 1 Add by counting on within 20
- Step 2 Add ones using number bonds
- Step 3 Find and make number bonds to 20
- Step 4 Doubles
- Step 5 Near doubles
- Step 6 Subtract ones using number bonds
- Step 7 Subtraction – counting back
- Step 8 Subtraction – finding the difference



$$4 + 2 = \underline{\quad}$$



$$14 + 2 = \underline{\quad}$$



$$12 + 4 = \underline{\quad}$$

Procedural fluency and conceptual understanding are developed side by side.

# WHITE ROSE SCHEME



NUMBER  
FLUENCY



# WHITE ROSE SCHEME: GROWTH MINDSET, PROBLEM SOLVING AND REASONING



# WHITE ROSE SCHEME

|             | Week 1                               | Week 2 | Week 3   | Week 4                             | Week 5  | Week 6 | Week 7  | Week 8 | Week 9   | Week 10 | Week 11       | Week 12 |
|-------------|--------------------------------------|--------|--|------------------------------------|---|--------|---|--------|--|---------|---------------|---------|
| Autumn term | Number<br><b>Place value</b><br>VIEW |        |  |                                    | Number<br><b>Addition and subtraction</b><br>VIEW |        |   |        | Geometry<br><b>Shape</b><br>VIEW                             |         |               |         |
| Spring term | Measurement<br><b>Money</b><br>VIEW  |        | Number<br><b>Multiplication and division</b><br>VIEW |                                    |   |        | Measurement<br><b>Length and height</b><br>VIEW |        | Measurement<br><b>Mass, capacity and temperature</b><br>VIEW |         |               |         |
| Summer term | Number<br><b>Fractions</b><br>VIEW   |        |  | Measurement<br><b>Time</b><br>VIEW |   |        | <b>Statistics</b><br>VIEW                       |        | Geometry<br><b>Position and direction</b><br>VIEW            |         | Consolidation |         |

## Multiplication and division

Spring Term

Scheme of learning

Reasoning and problem solving questions

End of block assessment (version A)

Topic based CPD – **New for 2022/23**

### Premium resources

Flashback 4

Step 1 Recognise equal groups

Step 2 Make equal groups

Step 3 Add equal groups

Step 4 Introduce the multiplication symbol

Step 5 Multiplication sentences

Step 6 Use arrays

Step 7 Make equal groups – grouping

Step 8 Make equal groups – sharing

Step 9 The 2 times-table

Step 10 Divide by 2

Step 11 Doubling and halving

Step 12 Odd and even numbers

Step 13 The 10 times-table

Step 14 Divide by 10

Step 15 The 5 times-table

Step 16 Divide by 5

Step 17 The 5 and 10 times-tables



# ACTIVITY 1

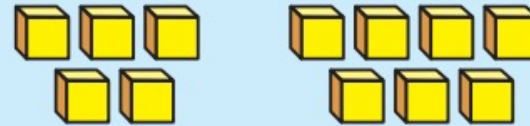
What do you know about the number 12?

NUMBER  
FLUENCY  
*What is it?*

# CONCRETE, PICTORIAL AND ABSTRACT (CPA) APPROACH

## Concrete

Children should have the opportunity to work with physical objects/concrete resources, in order to bring the maths to life and to build understanding of what they are doing.



## Pictorial

Alongside concrete resources, children should work with pictorial representations, making links to the concrete.

Visualising a problem in this way can help children to reason and to solve problems.



## Abstract

With the support of both the concrete and pictorial representations, children can develop their understanding of abstract methods.

$$5 + 7$$


# CONCRETE, PICTORIAL AND ABSTRACT (CPA) APPROACH

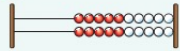
## Activities and symbols

### Key Stage 1 activities

Key Stage 1 includes more hands-on activities alongside questions.


An activity to be led by the teacher


 Use a Rekenrek in the ready position.



Ask children to show a number on their Rekenrek.


An outside activity or one that uses resources from nature

 Find some seeds and leaves to represent Autumn.




Ask children to sort the objects in three different ways and then compare their answers with a partner.

An activity introduced by a reading from an appropriate fiction or non-fiction book


 Read *The Button Box* by M Reid.

Give children a selection of buttons and ask them to sort the buttons in as many different ways as they can.




Encourage them to think about size, shape, colour and number of holes.

An investigation






 Give children a selection of 3D shapes.

Ask children to sort the objects into two groups and then challenge a partner to say how the objects have been sorted.



### Key Stage 1 and 2 symbols

The following symbols are used to indicate:

-  concrete resources might be useful to help answer the question
-  a bar model might be useful to help answer the question
-  drawing a picture might help children to answer the question
-  children talk about and compare their answers and reasoning
-  a question that should really make children think. The question may be structured differently or require a different approach from others and/or tease out common misconceptions.

# CONCRETE, PICTORIAL AND ABSTRACT (CPA) APPROACH

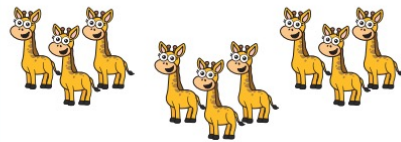
Year 2 | Spring term | Block 2 - Multiplication and division | Step 7

White  
Rose  
Maths

## Make equal groups – grouping

### Reasoning and problem solving

Write a division and a multiplication to match the picture.



$$9 \div 3 = 3$$
$$3 \times 3 = 9$$

What do you notice?

Dan has 30 stickers.

He groups the stickers, so that there is the same number of stickers in each group.

What groups could Dan have made?

Talk about it with a partner.

multiple possible answers, e.g.  
10 groups of 3  
5 groups of 6

Tiny has made 5 equal groups of counters.

I started with more than 10 counters, but fewer than 35 counters.



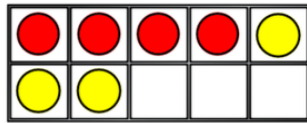
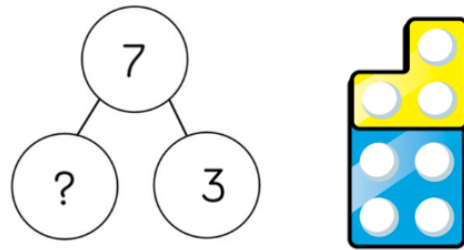
How many counters could Tiny have started with?

How many counters will there be in each group?

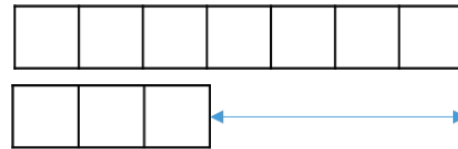
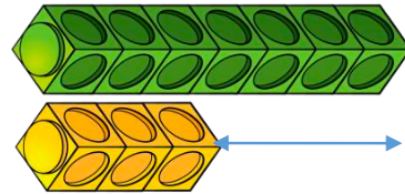
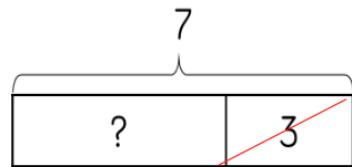
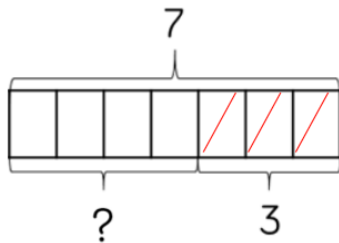
Compare answers with a partner.

15 counters in 5 groups of 3  
20 counters in 5 groups of 4  
25 counters in 5 groups of 5  
30 counters in 5 groups of 6

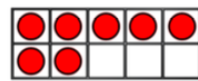
# CONCRETE, PICTORIAL AND ABSTRACT (CPA) APPROACH



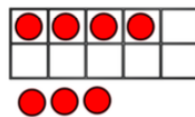
$$7 - 3 = 4$$



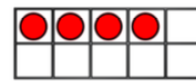
First



Then

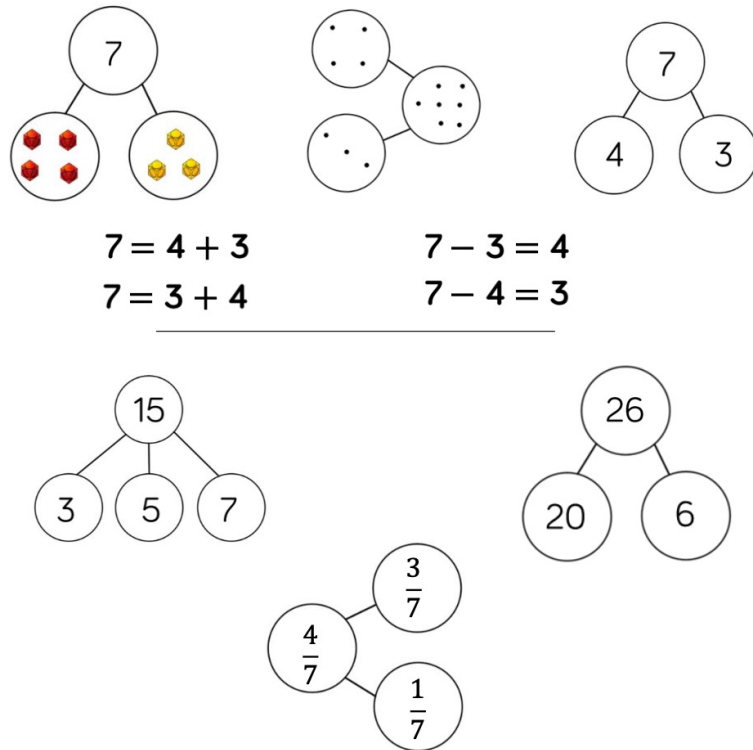


Now



# CPA MODELS & IMAGES

## Part-Whole Model



### Benefits

This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

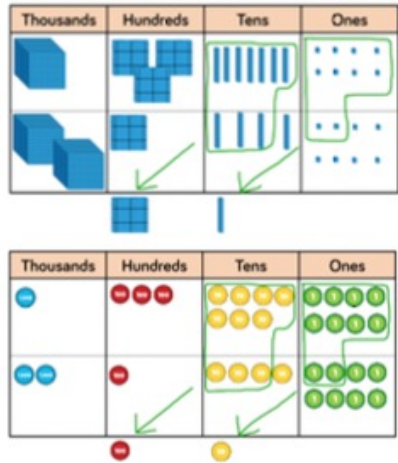
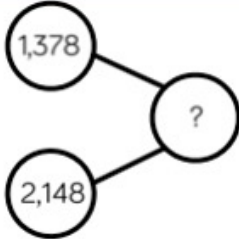
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.

Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns.

In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

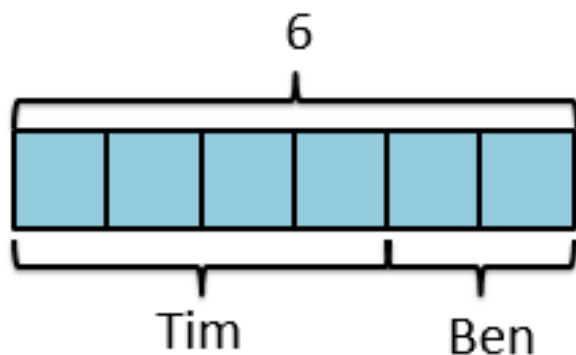
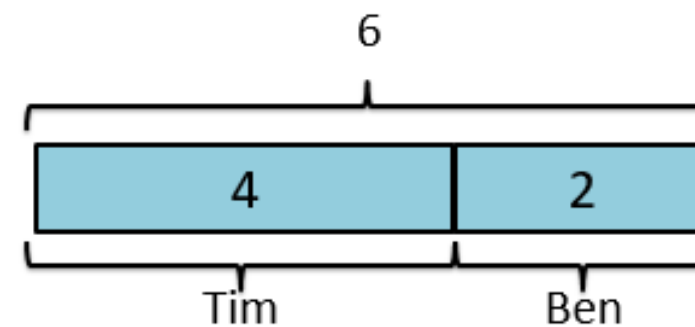
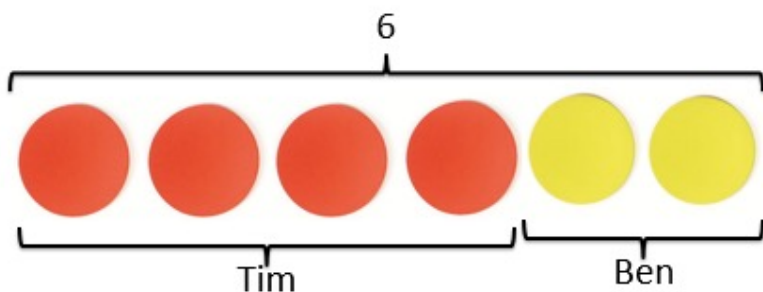
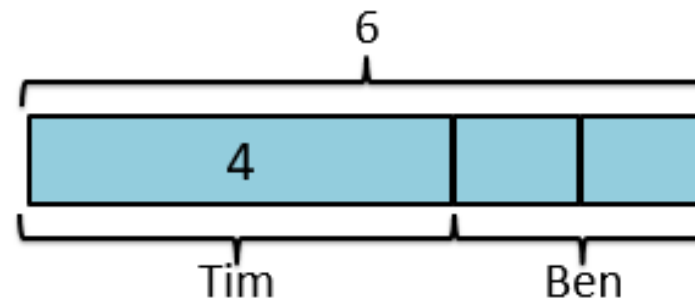
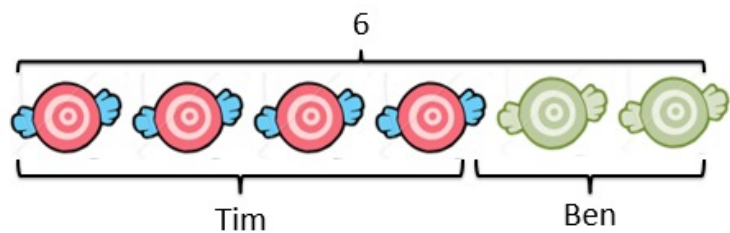
# CPA MODELS & IMAGES

| Year 4                                 |   |   |   |
|--|---|---|---|
| Skills & Stem sentences                | Concrete (Can we make it?)  | Pictorial (Can we draw it?)   | Abstract (Can we write the equation?)   |
| <p>Add numbers with up to 4 digits</p> | <p>Base 10 and place value counters are the most effective manipulatives when adding numbers up to 4 digits</p>  <p>The top chart uses base 10 blocks to represent 1,378 (1 thousand cube, 3 hundred flats, 7 ten rods, 8 one units) and 2,148 (2 thousand cubes, 1 hundred flat, 4 ten rods, 8 one units). Green arrows show the process of exchanging 10 ones for 1 ten, 10 tens for 1 hundred, and 10 hundreds for 1 thousand. The bottom chart uses place value counters (blue for thousands, red for hundreds, yellow for tens, green for ones) to show the same process, with a red counter being moved to the thousands column and a yellow counter to the tens column.</p> |  | <p>Ensure children write out their calculation alongside any concrete resources so they can see links with the column method.</p> $  \begin{array}{r}  1378 \\  + 2148 \\  \hline  3526 \\  \text{11}  \end{array}  $ |

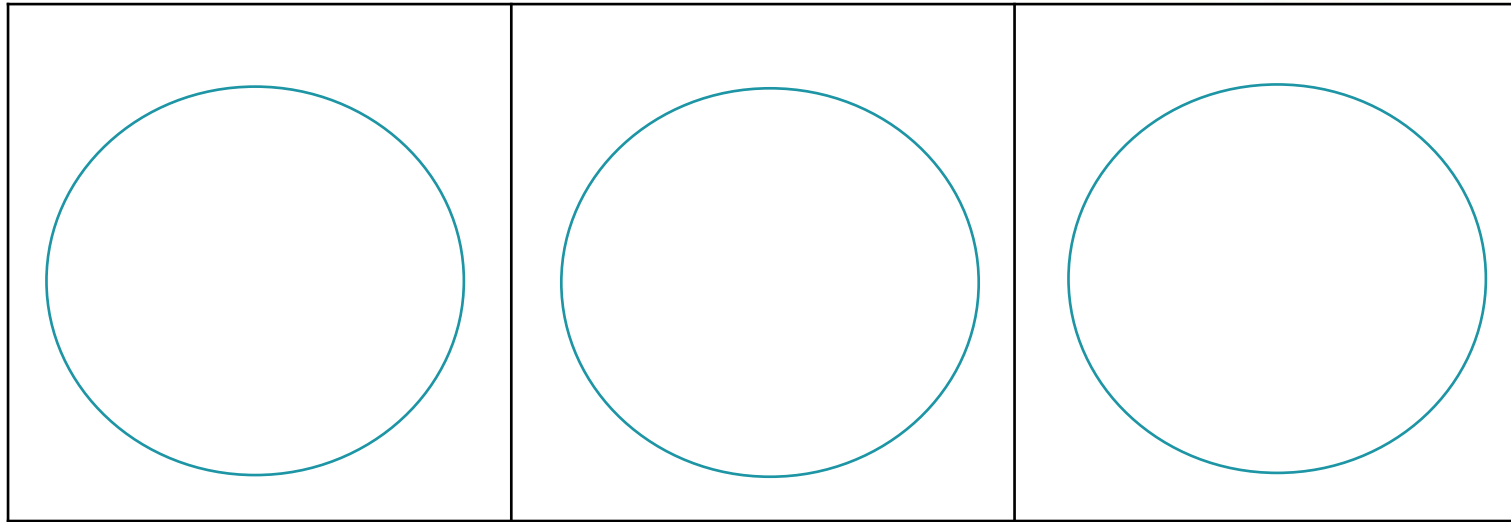




# CPA MODELS & IMAGES: BAR MODELS (SINGLE)



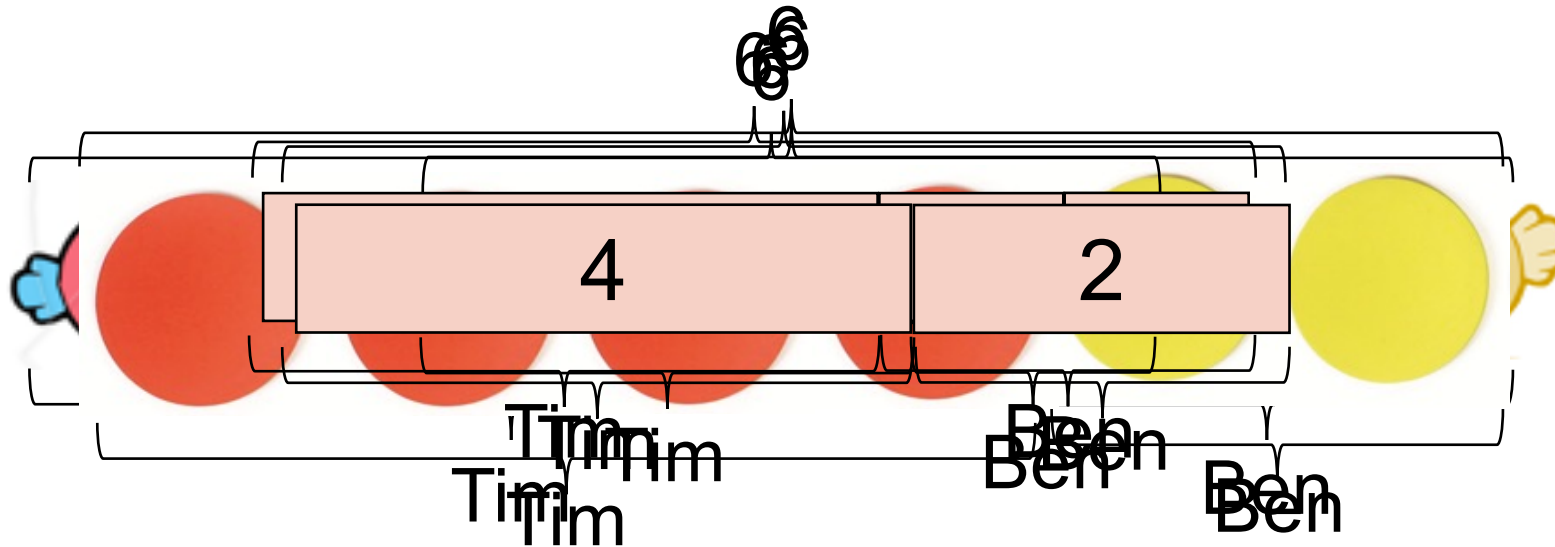
# CPA MODELS & IMAGES: BAR MODELS (SINGLE)





# CPA MODELS & IMAGES: BAR MODELS

Tim has 4 sweets and Ben has 2 sweets.  
How many sweets do they have altogether?

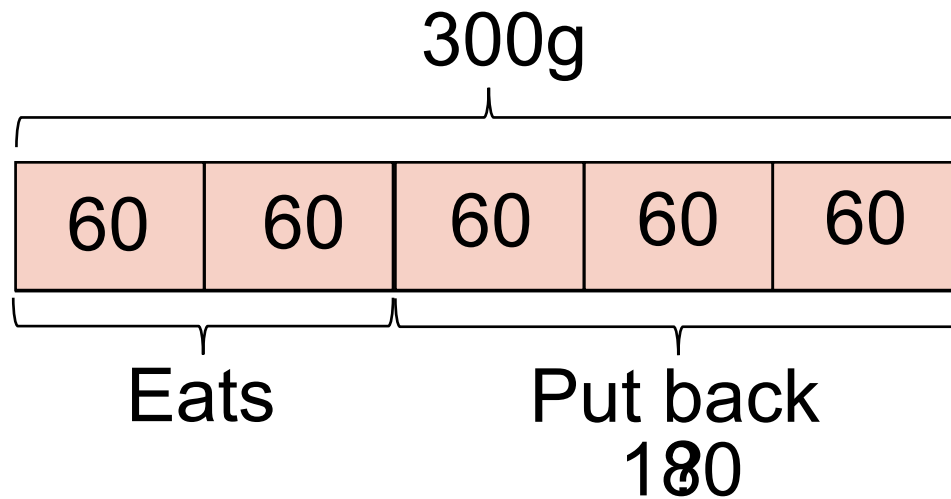


## CPA MODELS & IMAGES: BAR MODELS (SINGLE)

**Solve...** Matthew has a 300g block of cheese. He eats  $\frac{2}{5}$  of the cheese and puts the rest back in the fridge.

How much cheese did Matthew put back in the fridge?

- Model

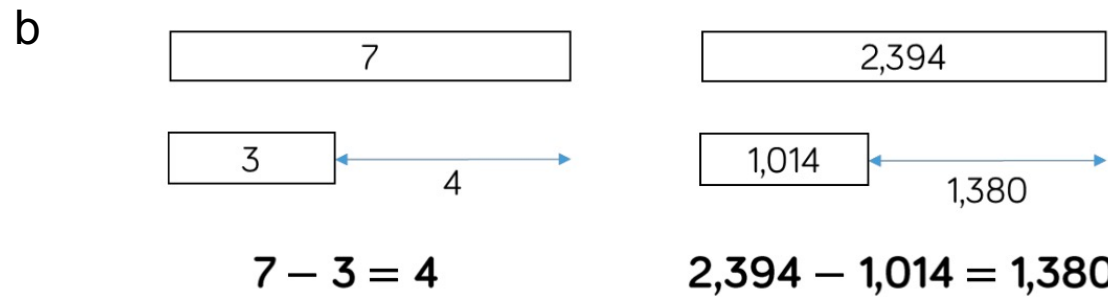
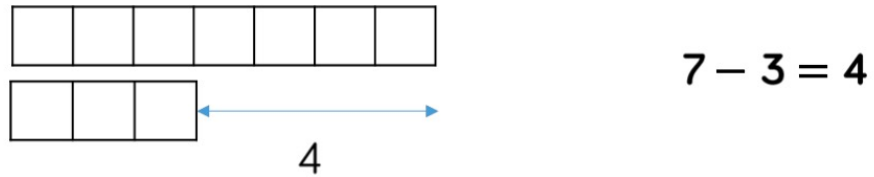
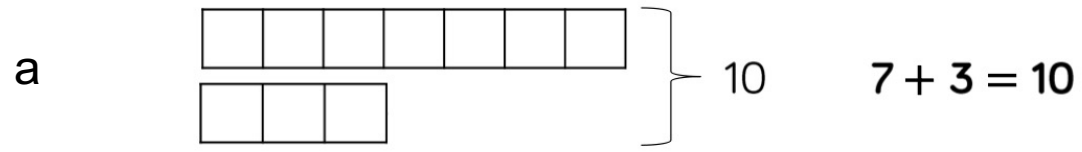


- Calculations

$$300 \div 5 = 60$$

$$3 \times 60 = 180$$

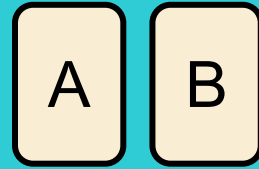
# CPA MODELS & IMAGES: BAR MODELS (MULTIPLE)



## ACTIVITY 3

Here are 2 number cards.

- B is three times the size of A
- The difference between A and B is 56

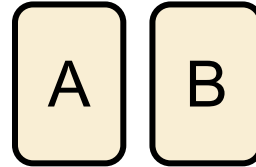


Find the sum of the two numbers.

# CPA MODELS & IMAGES: BAR MODELS (MULTIPLE)

Here are 2 number cards.

- B is three times the size of A
- The difference between A and B is 56



Find the sum of the two numbers.

| MODEL   | CALCULATIONS                         |
|---|--------------------------------------|
| <p>A bar model diagram showing two bars, A and B. Bar A is a single rectangle labeled '28'. Bar B is a longer rectangle divided into three equal segments, each labeled '28'. A double-headed arrow between the right side of bar A and the left side of bar B is labeled '56'. A bracket on the right side of the bars is labeled '112'.</p> | $56 \div 2 = 28$ $4 \times 28 = 112$ |



# THE IMPORTANCE OF BAR MODELLING

“Instead of relying on rote to help children, avoid drawing traps children to think clues like key words, the simple visual diagrams children can use to solve story problems help children understand why the appropriate operations make sense.”

which operations to use. Brsten 2014  
Beckmann 2014  
Beckmann 2014  
Bah Har 2016

# TAKE HOMES...

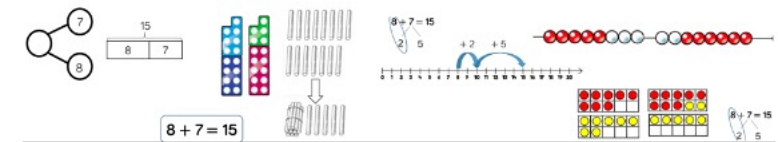
<https://whiterosemaths.com/resources/digital-tools>



## CPA Models & Images

| Representation       | Image  | Information   |
|----------------------|--|---|
| Bar model (single)   | <p>Concrete </p> <p>Discrete </p> <p>Combination </p> <p>Continuous </p> <p></p> | <p>Bar models can support children in representing calculations and help them to unpick the structure.</p> <p>Cubes/counters can be used in a line as a concrete representation of a bar model. Discrete bar models are a good starting point with smaller numbers as each box represents a whole.</p> <p>The combination bar model can support children to calculate by counting on from the larger number and is a good steppingstone towards the continuous bar model. Continuous bar models are good for a range of values.</p> |
| Bar model (multiple) | <p>Discrete </p> <p>Continuous </p>  | <p>The multiple bar model is a good way to compare quantities whilst still unpicking the structure. Two or more bars can be drawn with bracket labelling. Smaller numbers can be represented with discrete bars whereas continuous bar models are effective for larger numbers. Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.</p>  |

## Other Manipulatives



**ANY QUESTIONS?**



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**THANK YOU**