Addition and Subtraction

Parent Workshop - How we teach addition and subtraction so that they really understand

Aims of workshop

- Counting
- Written Methods for addition and subtraction
- Mental Methods for addition and subtraction
- Reasoning and problem solving with addition and subtraction
- Growth Mindset

The national curriculum for mathematics aims to ensure that all pupils:

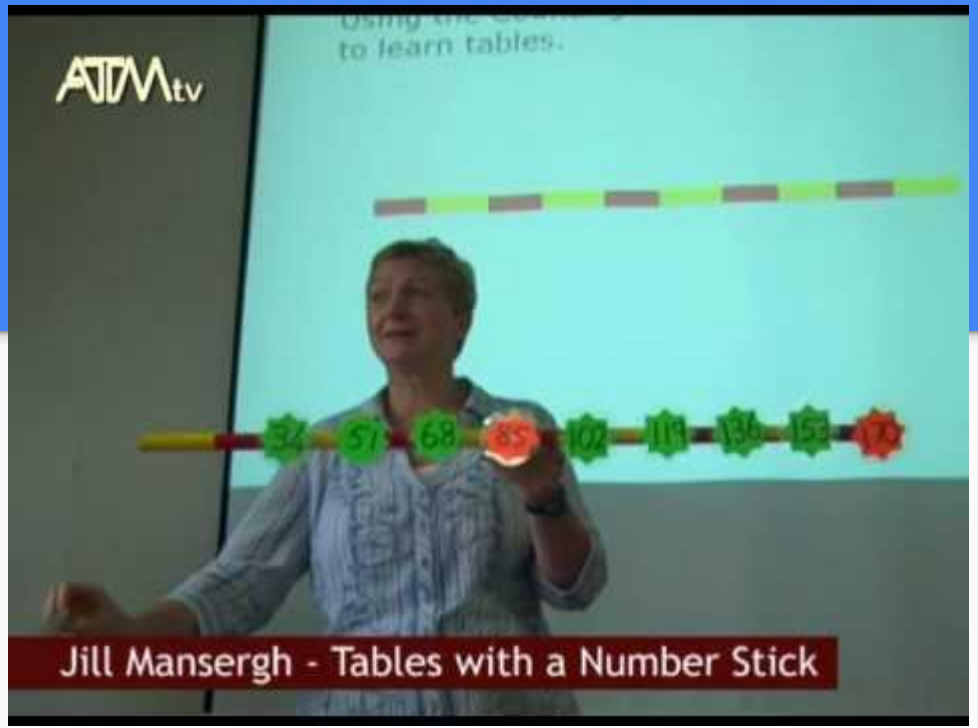
• become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

• reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

• can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. … pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. National Curriculum 2014

Counting



https://www.youtube.com/watch?v=yXdHGBfoqfw

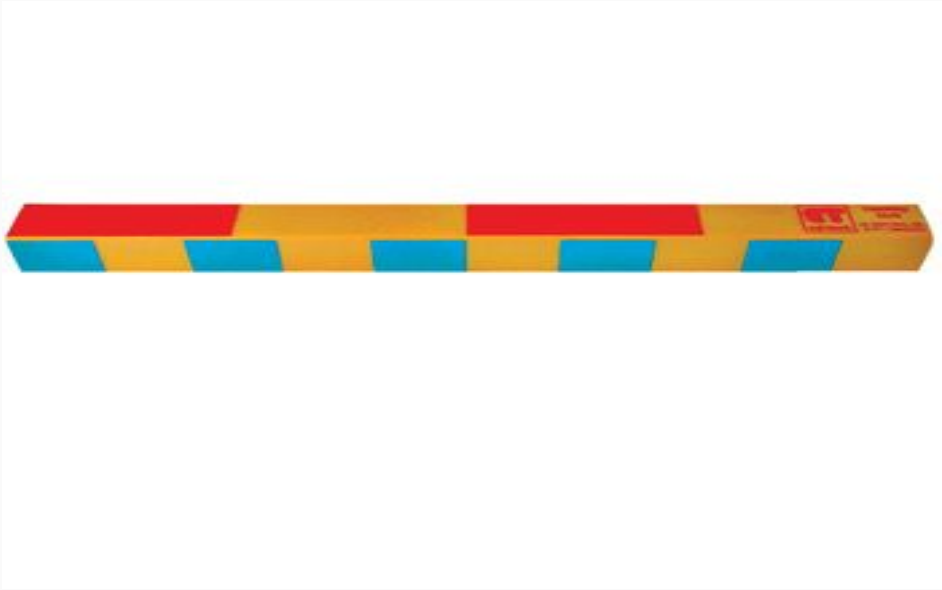
Counting in the new curriculum

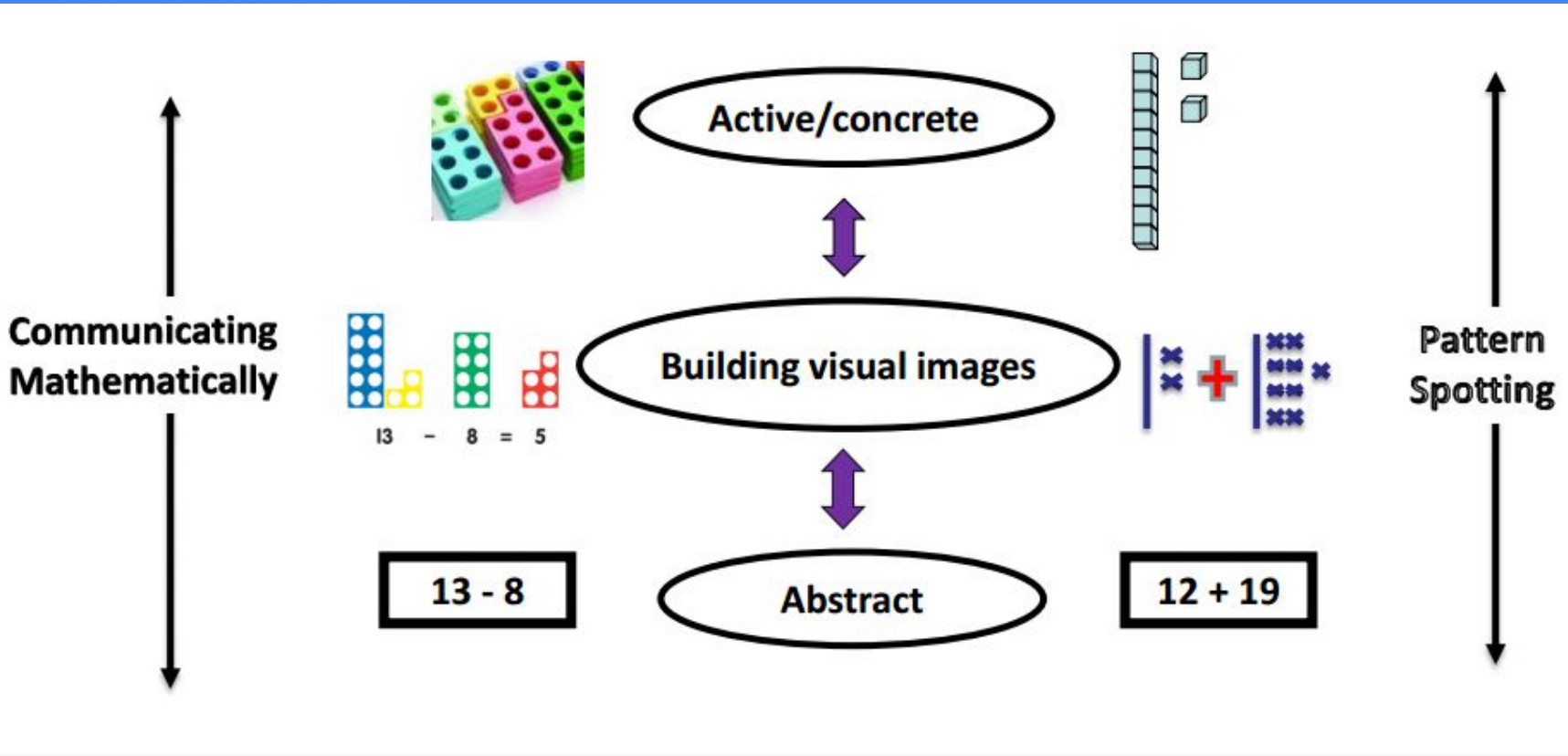
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- count in multiples of 6, 7, 9, 25 and 1000
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero

Counting in the new curriculum

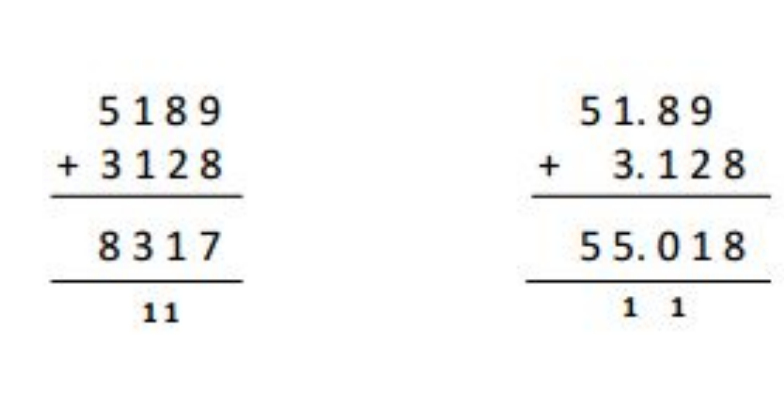
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward - year 2
- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number - year 3
- count in multiples of 6, 7, 9, 25 and 1000 - year 4
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 - year 5
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero - year 5

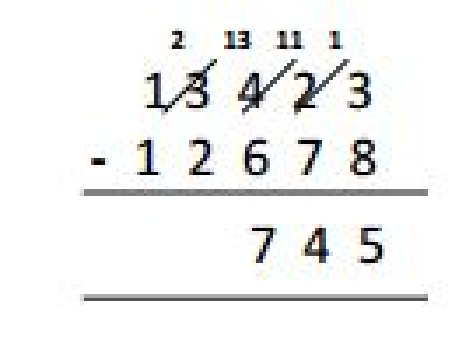
Counting Activities




Communicating Mathematically
Active/concrete
Building visual images
Abstract
13 - 8
12 + 19
13 - 8 = 5
Pattern Spotting

Written Methods





How do we get to here?

Year 2 Expectations - Addition

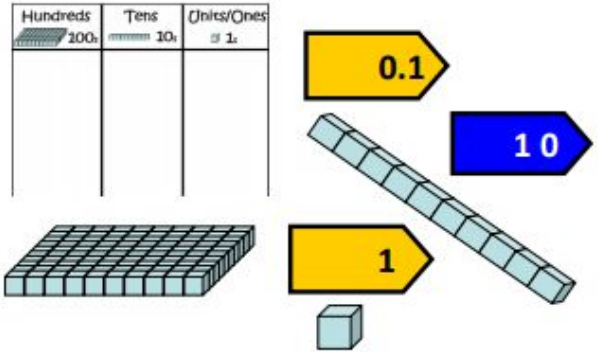
- Partition numbers in different ways - e.g. 23 = 20 + 3 or 10 + 13
- add and subtract including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - three one-digit numbers

They will be used to using practical resources to support their adding and subtracting

bead string

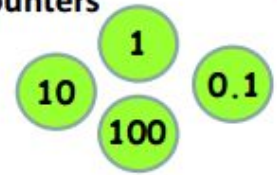
count stick

place value apparatus



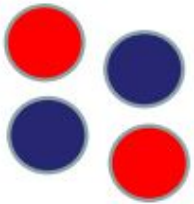
Multilink

place value counters



Cuisenaire

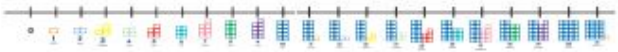
Numicon



double sided counters

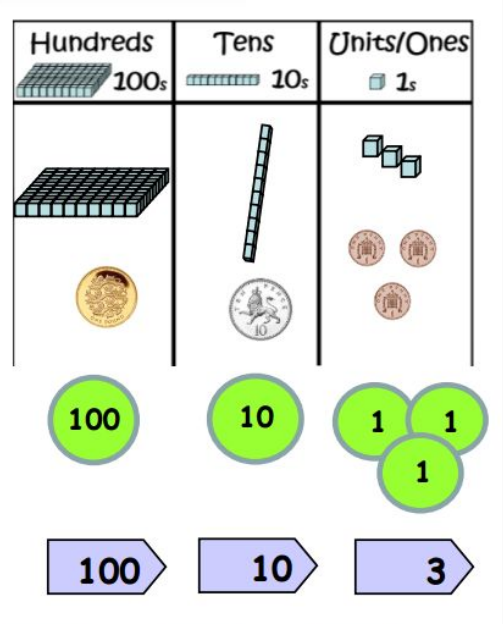
number grids 100 and 200

number line



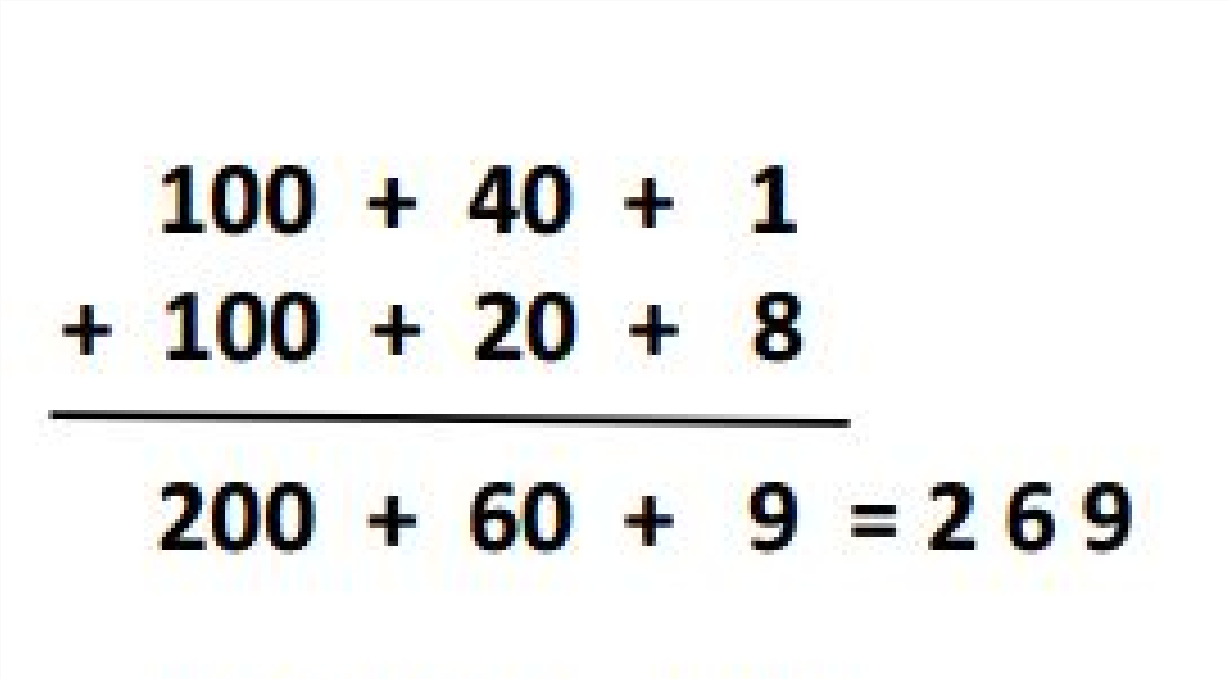
$$\begin{array}{r} 40 + 1 \\ +\ 20 + 8 \\ \hline 60 + 9 = 69 \end{array}$$

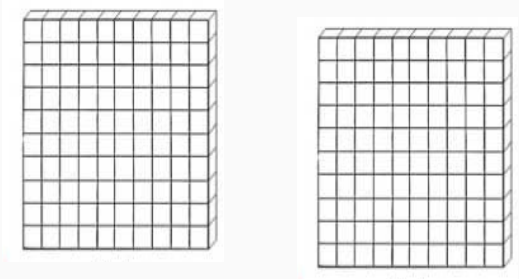
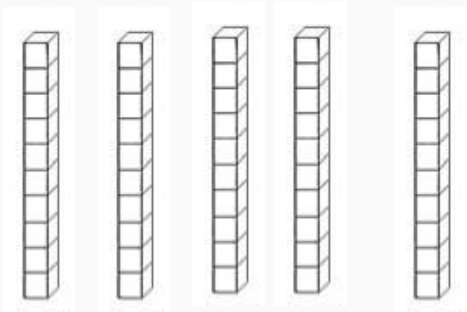
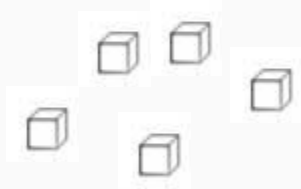
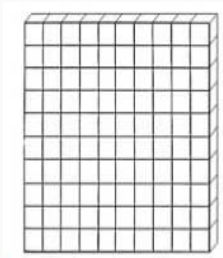
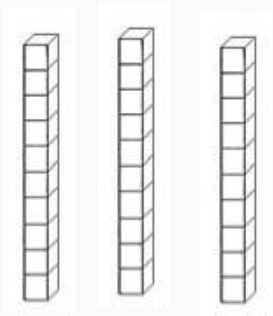
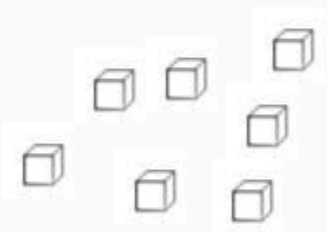
$$\begin{array}{r} 40 + 3 \\ 20 + 8 \\ \hline 70 + 1 \\ \hline 10 \end{array} = 71$$

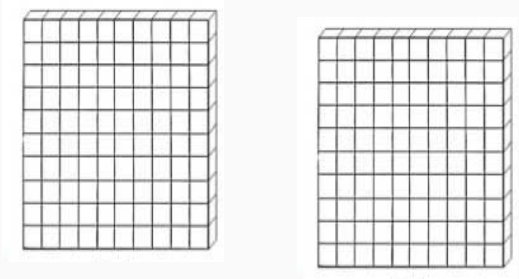
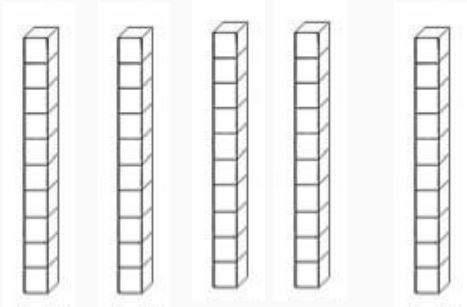
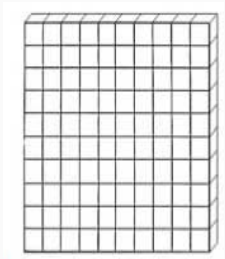
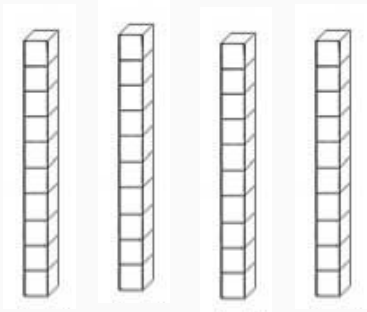


The children would use manipulatives alongside the methods to understand how they work!

Expanded recording



Hundreds 100s	Tens 10s	Units/ ones 10s
		
 300	 80	 12

Hundreds 100s	Tens 10s	Units/ ones 10s
		
		
300	90	2

Your turn

Have a go at:

- 247 + 145 = _____

Try to use the dienes to show what you are doing!

Moving on...

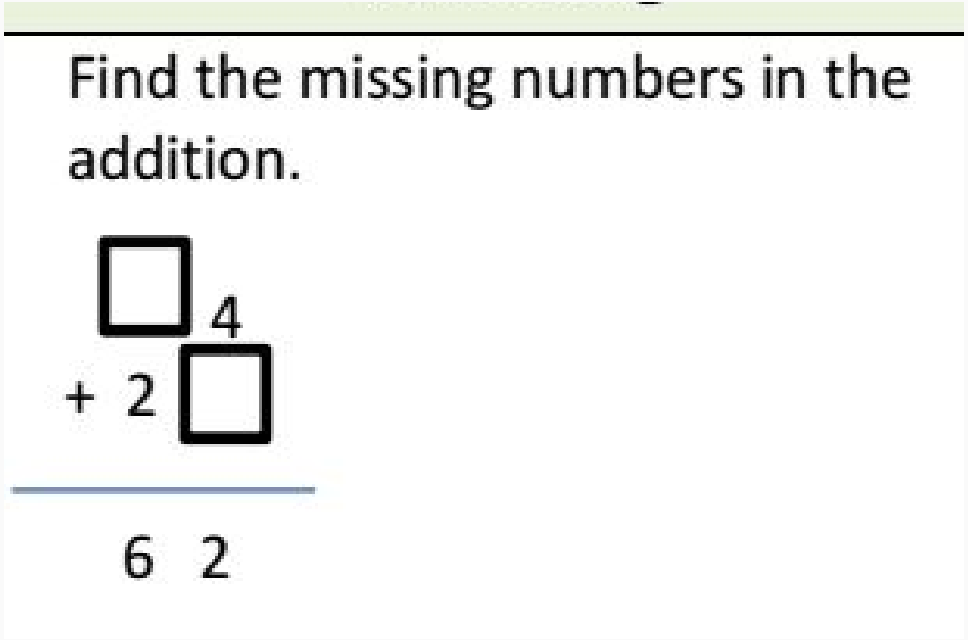
$$\begin{array}{r} 2141 \\ +\ 1128 \\ \hline 3269 \end{array} \qquad \begin{array}{r} 21.41 \\ +\ \ 1.12 \\ \ \ 0.35 \\ \hline 22.88 \end{array}$$

Column addition (no exchanging)

$$\begin{array}{r} 5189 \\ +\ 3128 \\ \hline 8317 \\ \hline 11 \end{array} \qquad \begin{array}{r} 51.89 \\ +\ \ 3.128 \\ \hline 55.018 \\ \hline 1\ \ 1 \end{array}$$

Column addition (with exchanging)

Challenge - building in *reasoning*



The children need to <u>really</u> understand how to use the method to find the missing numbers

Spot the mistake

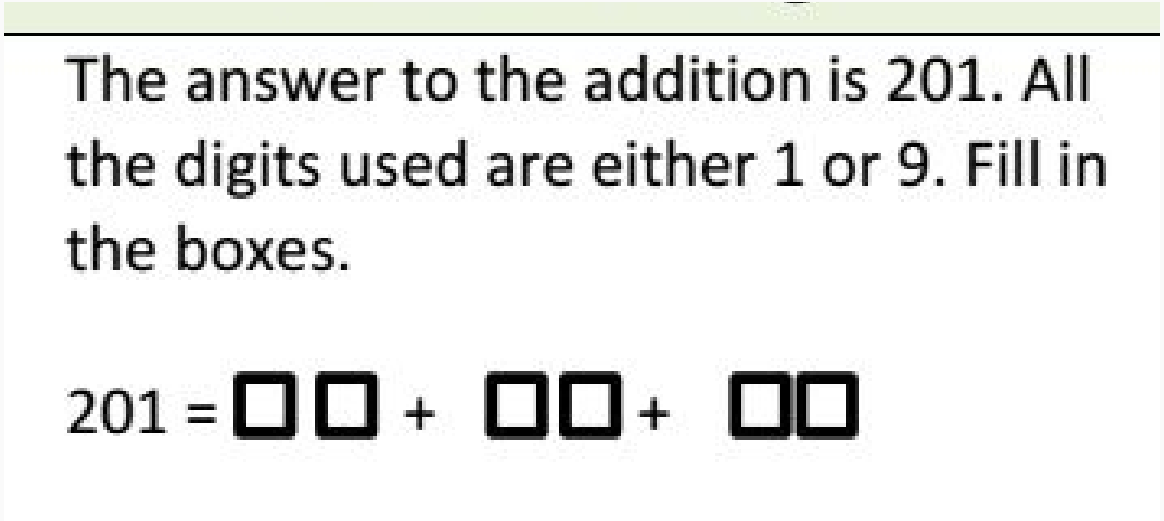
- Find the errors in the calculations and correct them to find the right answer.

Calculation	Error	Correct solution
256 + 347 2907		
63 - 38 35		

The children need to spot errors and explain where the mistake is!

Again, they need to really understand the method!

Multiple solutions



Is there more than 1 solution?

Have they found all of the solutions?

The children need to *convince*, *justify* and *explain*!

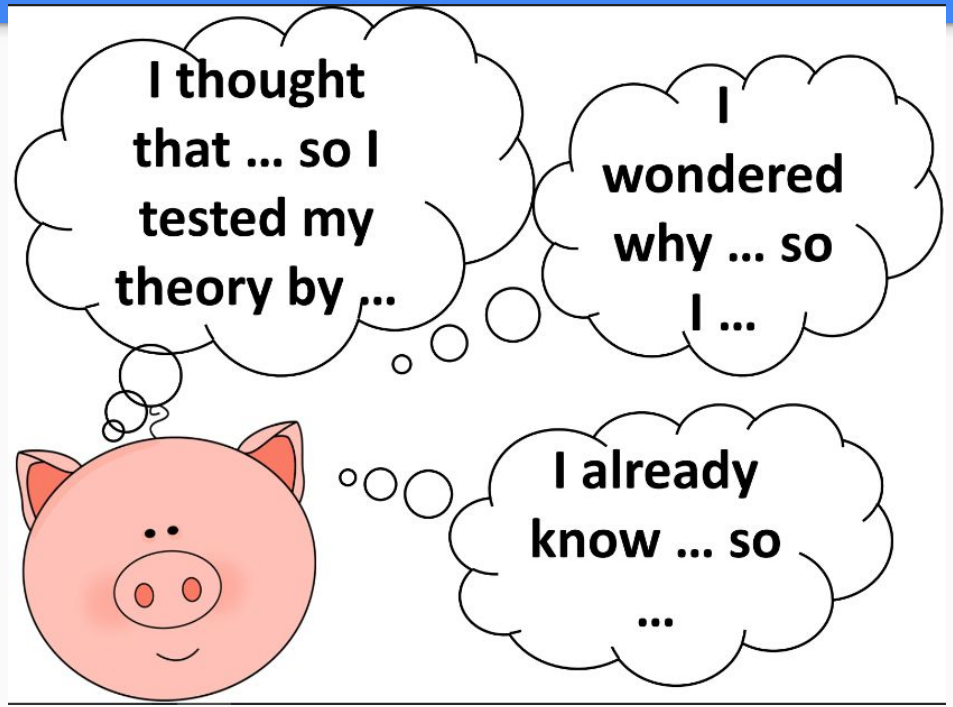
Reasoning

You have been given some reasoning tasks from years 3 to 6.

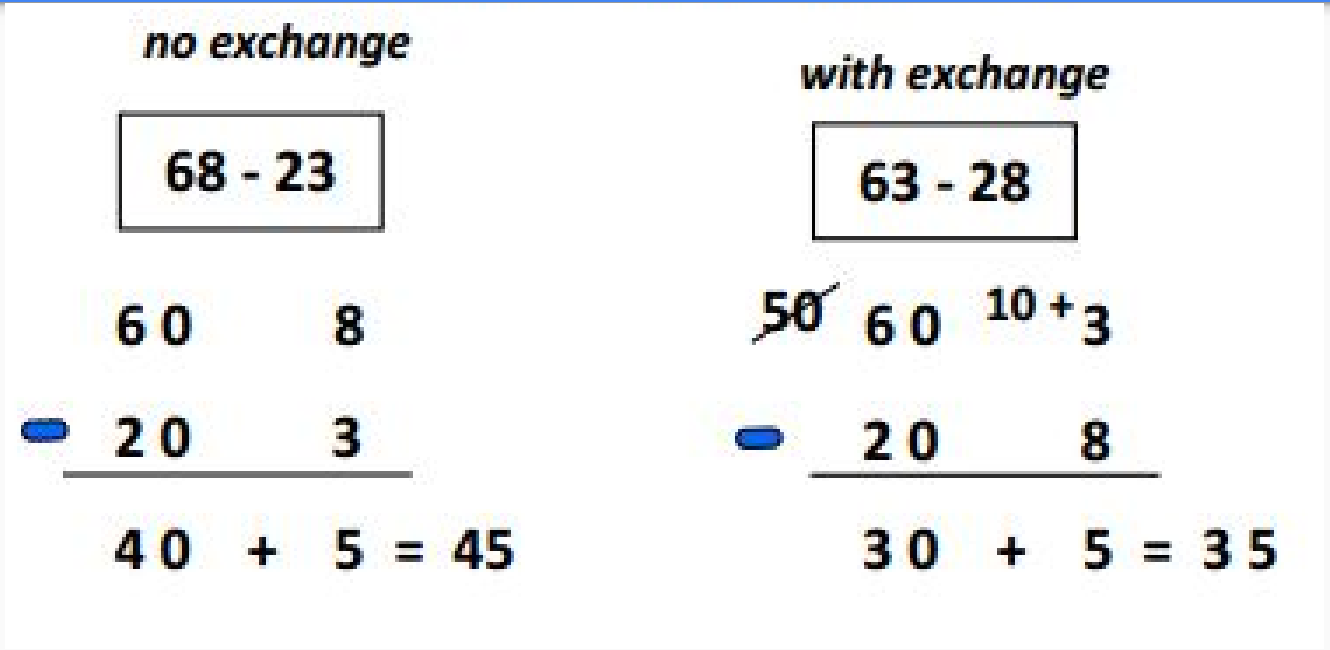
Can you work out which colour is which?

Find a problem from your child’s year group to solve!

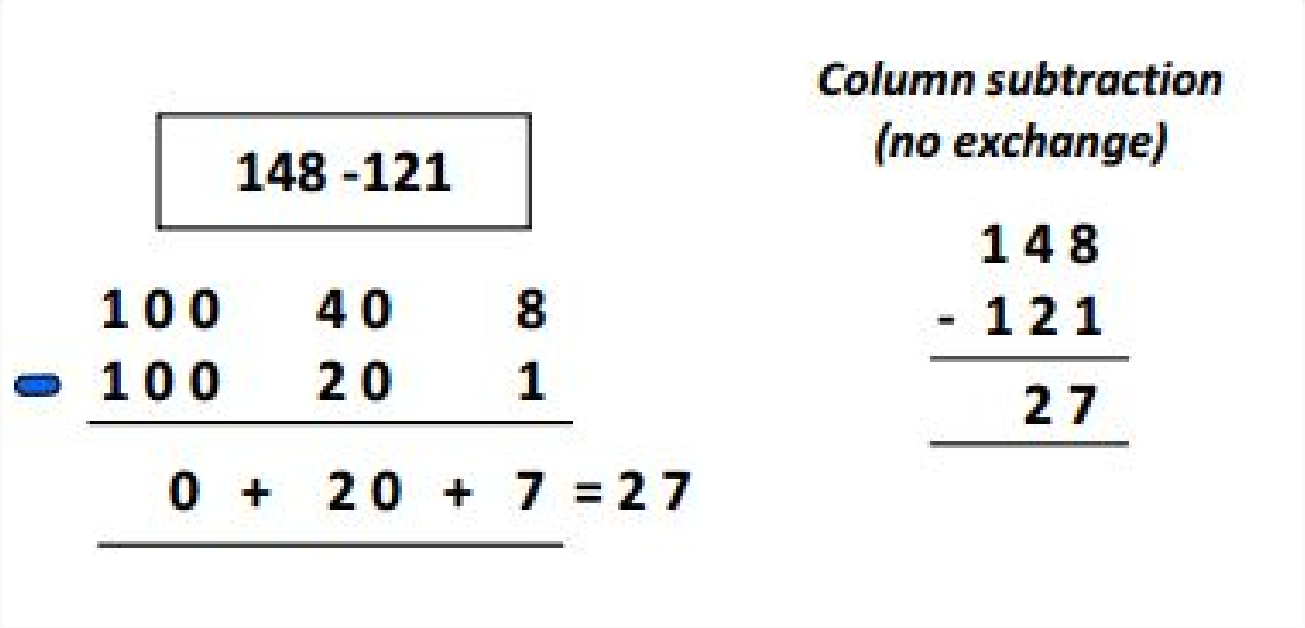
Supporting reasoning



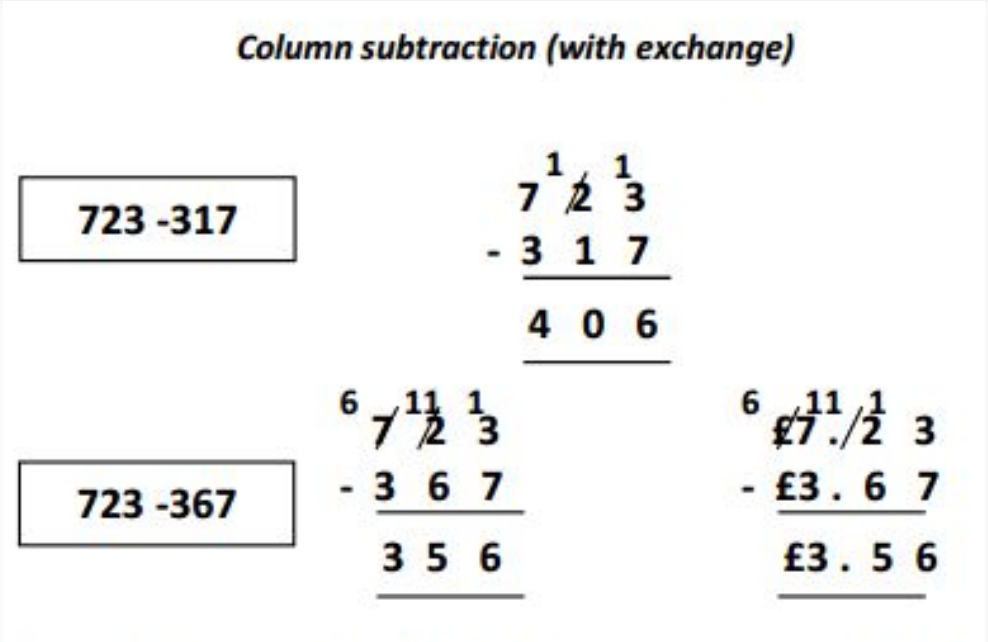
Subtraction



Moving on...


148 -121
100 40 8
- 100 20 1
0 + 20 + 7 = 27
Column subtraction
(no exchange)
148
- 121
27

And on...


Column subtraction (with exchange)
723 -317
7 1 2 1 3
- 3 1 7
4 0 6
723 -367
6 11 1
7 2 3
- 3 6 7
3 5 6
6 11 1
£7 . 2 3
- £3 . 6 7
£3 . 5 6

With Place Value Counters

Can you solve 4023 - 2918 using place value counters?

And on!

Column subtraction (no exchanging)

$$\begin{array}{r} 13548 \\ -\ 12128 \\ \hline 1420 \\ \hline \end{array}$$

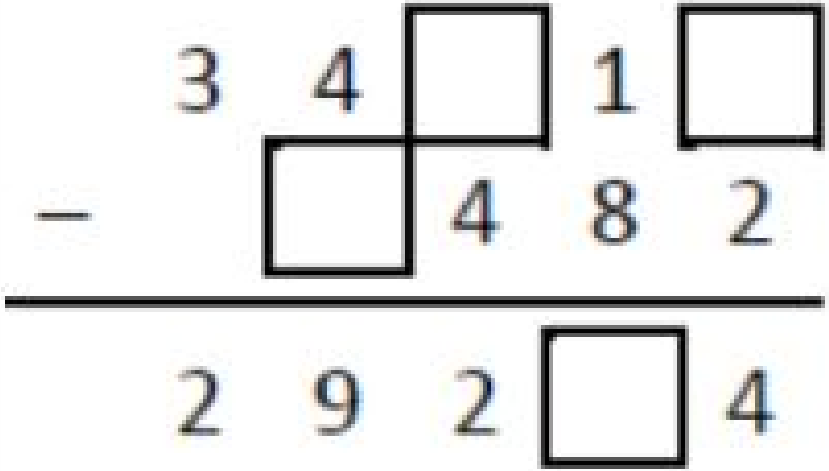
Column subtraction (with exchanging)

$$\begin{array}{r} {\scriptstyle 2\ \ 13\ \ 11\ \ 1} \\ 1\not{3}\ \not{4}\ \not{2}\ 3 \\ -\ 1\ 2\ 6\ 7\ 8 \\ \hline 7\ 4\ 5 \\ \hline \end{array}$$

Playing Games

The aim of the game is to get as close to 1000 as possible. Each player rolls their dice, and places the number in their calculation grid. Once both grids are full, subtract the 2 numbers and see who is the closest!

Problem Solving



Can you work out what the missing numbers would be?

9 Mr and Mrs Jones are saving for a holiday.

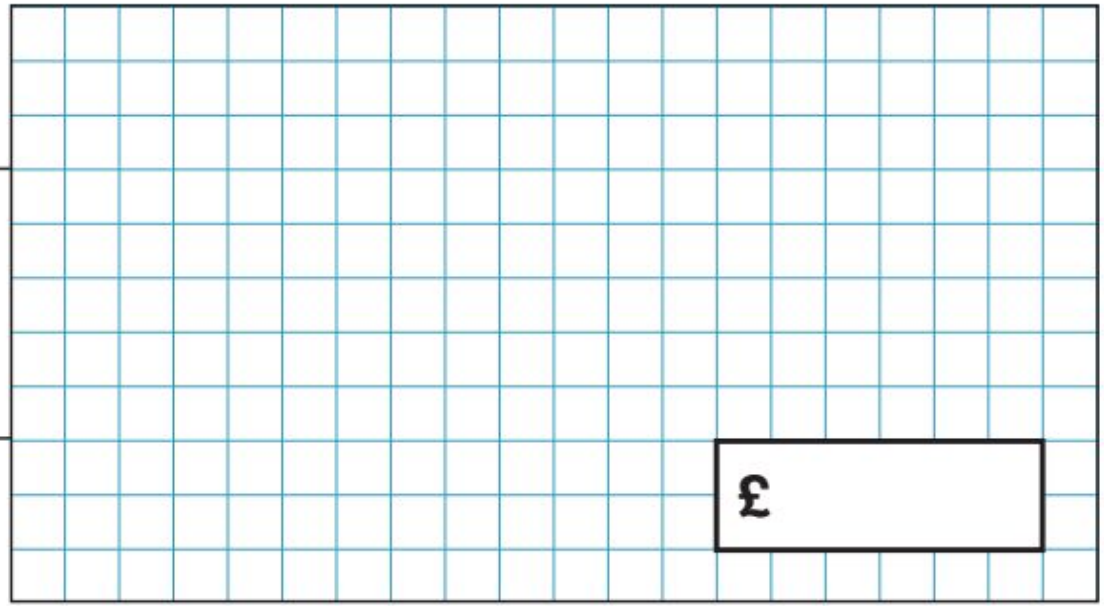
Mr Jones has saved £742

Mrs Jones has saved £1359

The holiday costs £3415

How much **more** do they need to save?

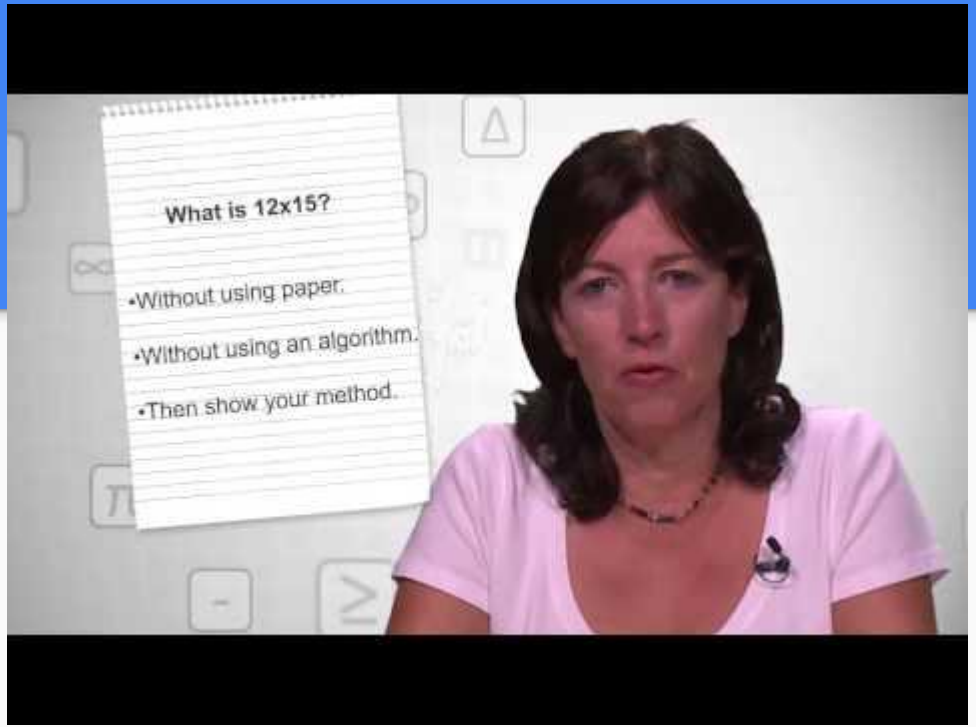
Show your method



£

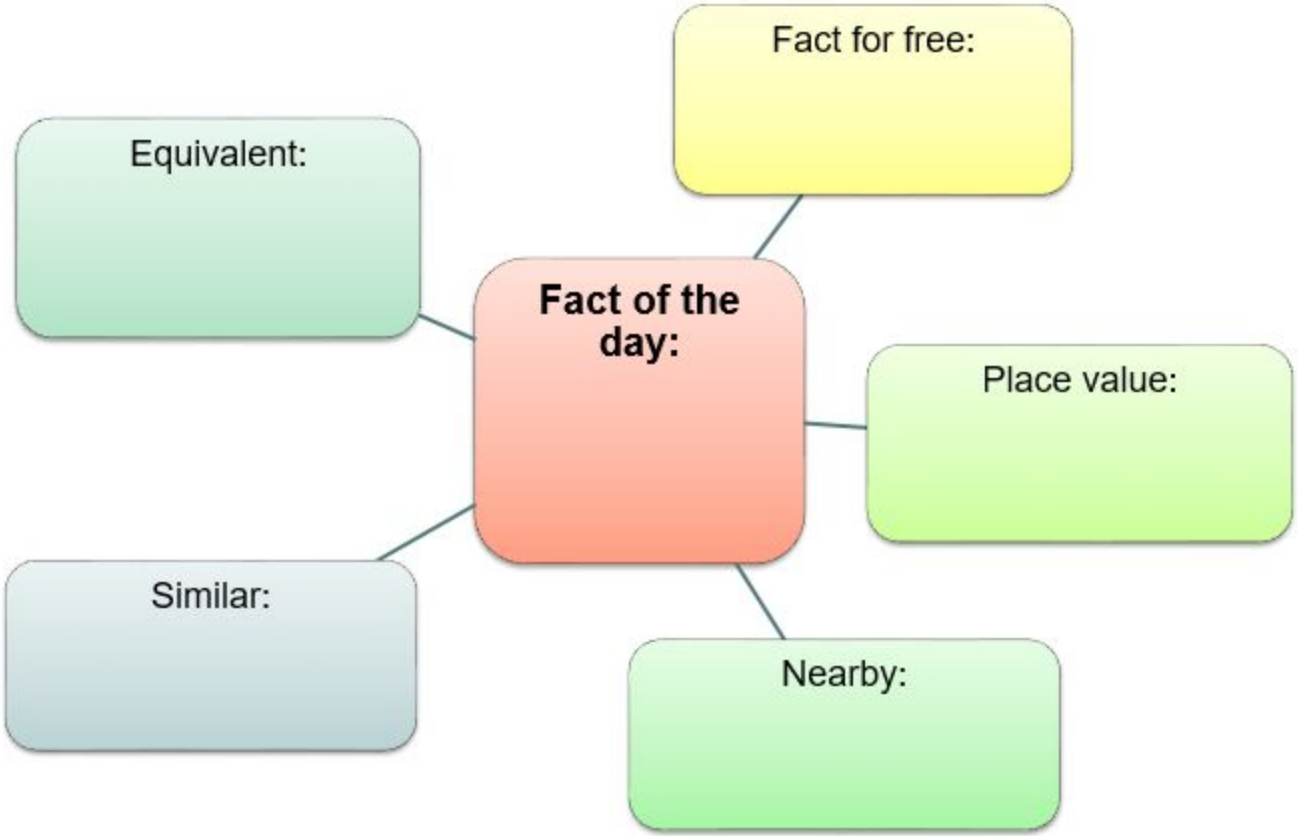
$$\begin{array}{r} 100000 \\ -\ 99999 \\ \hline \end{array}$$

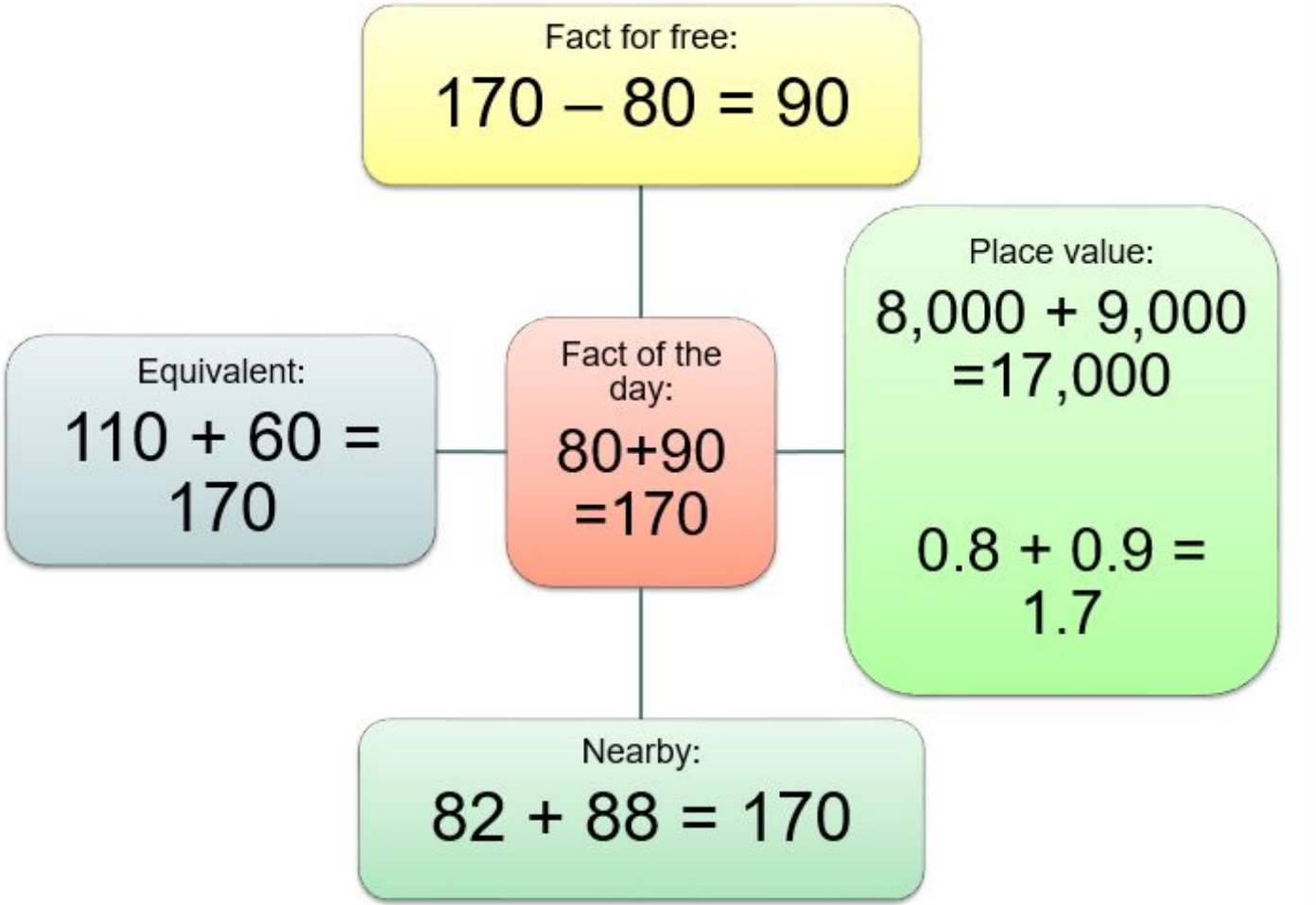
Number Talks



https://www.youtube.com/watch?v=yXNG6GKFhQM

Deriving facts





Derivation board – EdgeHill University

Growth Mindset

https://www.youtube.com/watch?v=3e9a4Hjc9SM

Fixed mind-set vs Growth mind-set

babcock
trusted to deliver™

An individual's learning is shaped by whether they believe their intelligence is fixed or can be changed:

- If you have a fixed mind set you believe that your abilities are fixed and that you can either do mathematics or you can't
- If you have a growth mind set you believe that you can learn and become better at mathematics
- Children who have a fixed mind set are at a significant disadvantage compared to children who have a growth mind set

Negative portrayal in the media

"Age is just a number and maths was never my thing."

L'Oréal Paris advert changed 2015

Product withdrawn by EE January 2016 after many complaints

DAVID & GOLIATH BLONDE PHONE SOCK - IM TOO PRETTY TO DO MATHS

£4.00

ADD TO BASKET

Damaging maths mindset holding pupils back

trusted to deliver™

30% wrongly believe that maths is a skill you are born with, rather than a skill that can be learnt.

"The cultural acceptability of saying 'I can't do maths'"

An international study (OECD) ranked the UK 26th out of 65 countries for maths ability.

Children in the UK the equivalent of 3 years behind peers in Shanghai.