

Maths Mastery: Early Years to Year Two

Feel free to peruse the handouts on the tables – there is a selection of work from KS1 books which shows specific mathematical concepts as well as some question examples

What is Maths Mastery?



- Mastering maths - pupils of all ages acquiring a deep, long-term and adaptable understanding of the subject.
- ‘Teaching for mastery’ - elements of our classroom practice that gives pupils the best chances of mastering maths.
- NCETM Maths Hub – teachers are trained as mastery specialists.
- ‘I just can’t do maths’ – teaching for mastery rejects this idea.
ALL pupils are encouraged by the belief that working hard and working within the strategies in the programme mean they can succeed.

Mastery in Maths




Our aim today is equip you with the skills to help support your child in understanding number and challenge them.

- **Fluency**
- **Rapid number facts**
- **Variation**

Vocabulary





- exchange
- calculation
- number sentence
- oblong 

hundreds tens ones
H T **1's**

digit →
→ **62**

number
62



- borrow or steal
- sum = total
- rectangle
(family name)
 
- units

Addition

$$\begin{array}{c} 6 \\ \text{addend} \end{array} + \begin{array}{c} 7 \\ \text{addend} \end{array} = \begin{array}{c} 13 \\ \text{sum} \end{array}$$

Subtraction

$$\begin{array}{c} 13 \\ \text{minuend} \end{array} - \begin{array}{c} 8 \\ \text{subtrahend} \end{array} = \begin{array}{c} 5 \\ \text{difference} \end{array}$$

Multiplication

$$\begin{array}{c} 6 \\ \text{factor} \end{array} \times \begin{array}{c} 8 \\ \text{factor} \end{array} = \begin{array}{c} 48 \\ \text{product} \end{array}$$

Division

$$\begin{array}{c} 48 \\ \text{dividend} \end{array} \div \begin{array}{c} 8 \\ \text{divisor} \end{array} = \begin{array}{c} 6 \\ \text{quotient} \end{array}$$

Number



Fluency

Reasoning

**Problem
solving**

Concrete 
Pictorial 
Abstract 

Reception

Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number.

Year One

Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.
Count, read and write numbers from 1-100 in numerals and words.

Use counting strategies to solve problems

Year Two

To read and write numbers to at least 100 in words and numerals.

To use the signs: $<$, $>$ and $=$

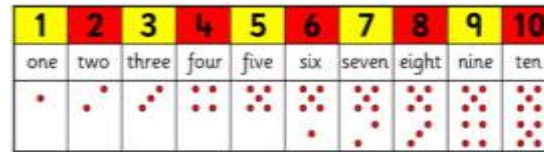
To compare and order numbers 0 to 100.

To identify, represent and estimate numbers.

Number

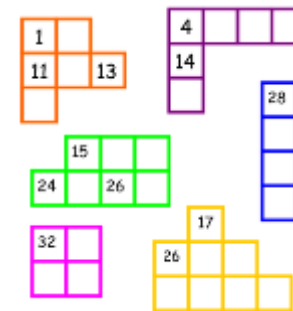
Early Years

- Matching amounts
- 1:1 correspondence
- Finding the total



Years One and Two

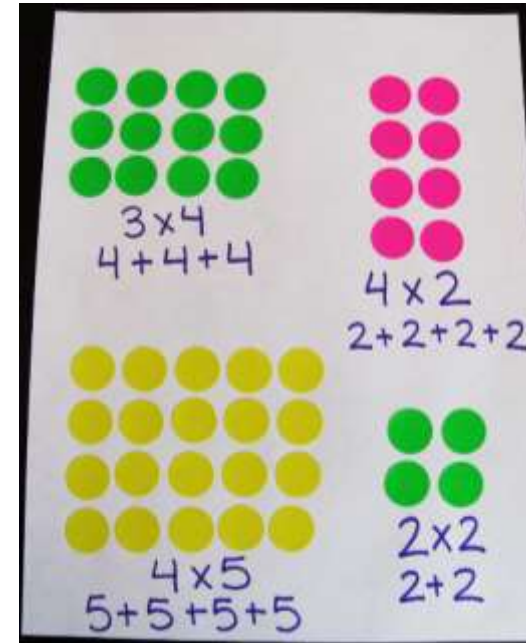
- Counting (reliably)
- Comparing ($>$, $<$, where numbers are in relation to one another)
- Composition (what's hidden inside numbers, structures)



Fluency in Number

Fluency demands more of learners than just memorisation of facts.

E.g. Counting in 2s, 5s and 10s



It encompasses a mixture of efficiency, accuracy and flexibility.

Scaffolding the talk – stem sentences



- One less than ___ is ___
- I have counted ___ altogether
- ___ comes after/before ___
- ___ has more than ___ because ___
- ___ has the least because ___
- ___ more than ___ is ___
- I have ___ and he has ___ so we have ___ altogether
- I had ___ and took ___ away so now we have ___

My whole number is 10. Part of my number is 4, the other part is 6.

60 is the same as 6 tens.
9 tens is the same as 90.

Progression in number skills

$$7 - 3 = 4$$



$$7 - 4 = 3$$



$$3 + 4 = 7$$

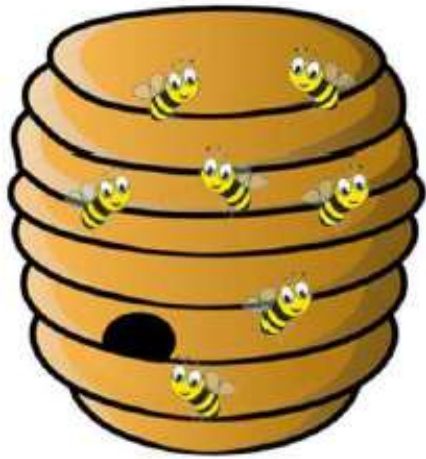


$$5 = 7 - 2$$



Talk task

How many calculations can you complete?



$$\square = 7 - \square$$

Why can't the digits 8 or 9 be used?

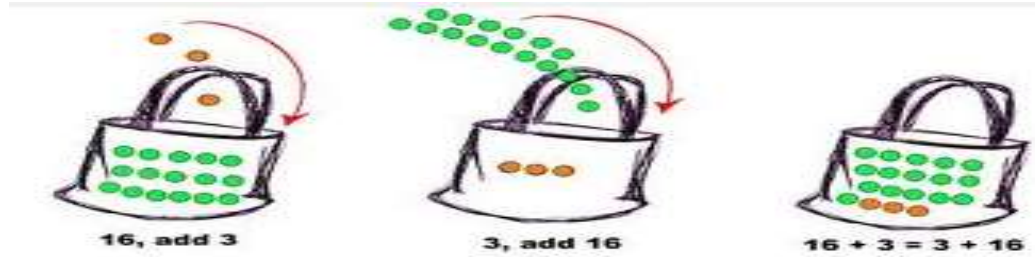
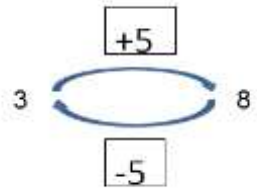


Variation and representations

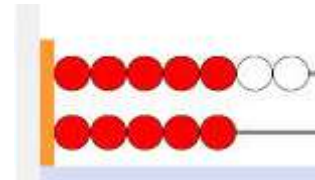
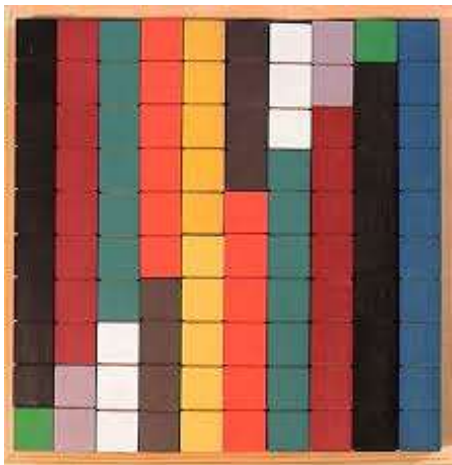
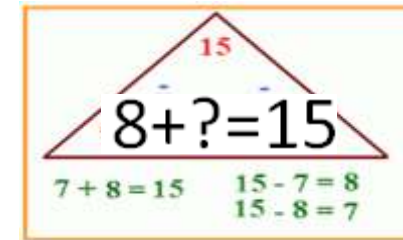


Conceptual variation

The opportunity to work on different representations of the same mathematical idea.

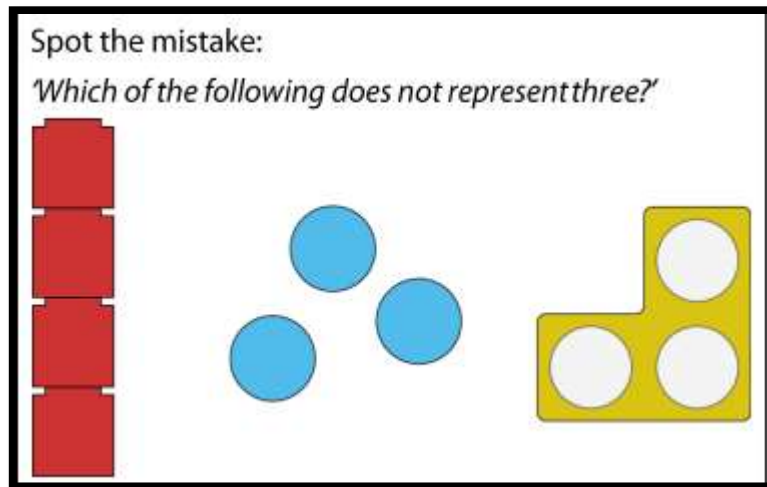


- 1 + 9
- 2 + 8
- 3 + 7
- 4 + 6
- 5 + 5
- 6 + 4
- 7 + 3
- 8 + 2
- 9 + 1



Variation and representations

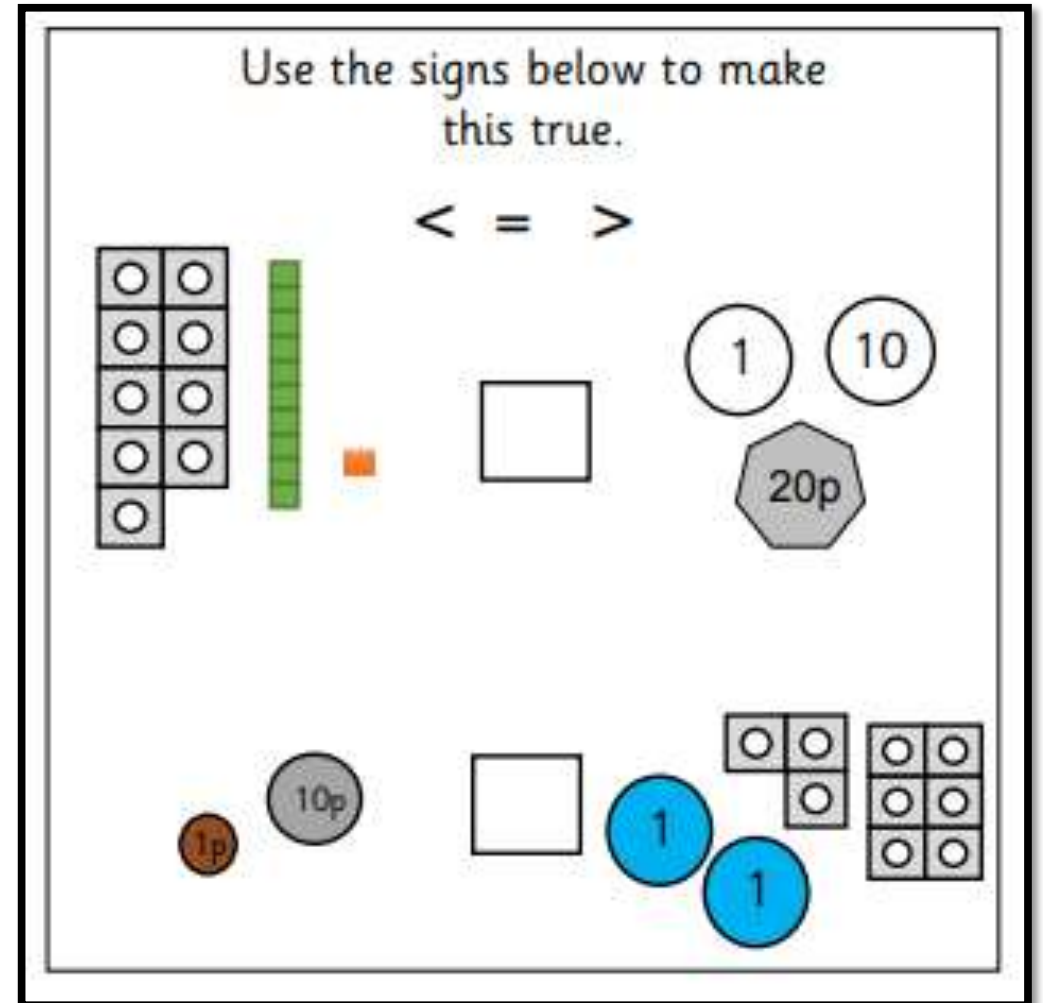
Spot the mistake:
Which of the following does not represent three?



The image shows three different visual representations of the number 3. On the left, there is a vertical stack of four red rectangles. In the middle, there are three blue circles. On the right, there is a yellow shape that is L-shaped, with three white circles inside it.

Use the signs below to make this true.

$< = >$



The image shows a math problem. At the top, it says "Use the signs below to make this true." Below this, there are three symbols: a less-than sign (<), an equals sign (=), and a greater-than sign (>). In the middle, there is a square box. To the left of the box, there is a vertical stack of 10 small grey circles, a vertical stack of 10 green rectangles, and a single orange square. To the right of the box, there is a circle with the number 1, a circle with the number 10, and a grey octagon with the number 20p. Below the box, there is a brown circle with 1p, a grey circle with 10p, a square box, two blue circles with the number 1, a vertical stack of 3 small grey circles, and a vertical stack of 6 small grey circles.

Challenges



- Are bigger numbers challenging your children?
- Is there an easier way to work out the answer?

Which questions are easy, which are hard?

$453 + 10 =$

$930 - 100 =$

$493 + 10 =$

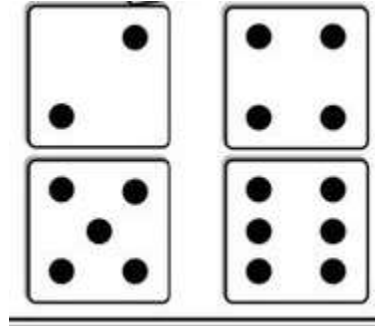
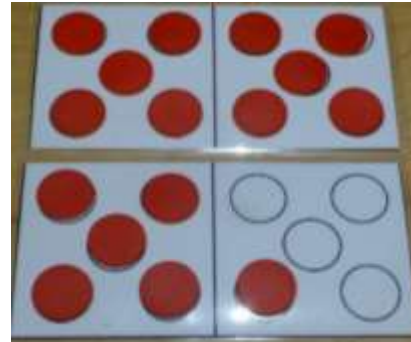
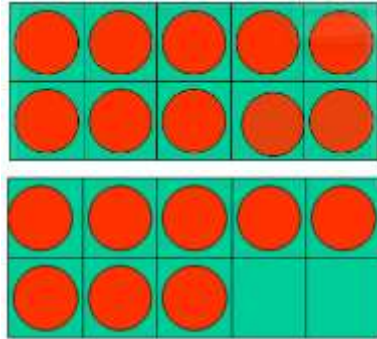
$910 - 120 =$



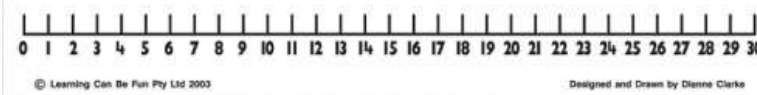
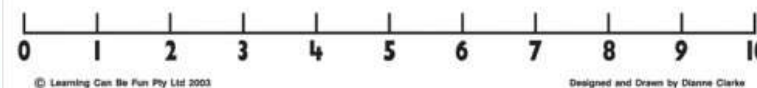
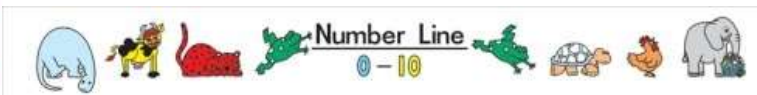
Why are some easy and some hard? Explain your reasons.

- Partitioning?
- Using 100 square
- It is ok to give your child manipulatives to work out answers!

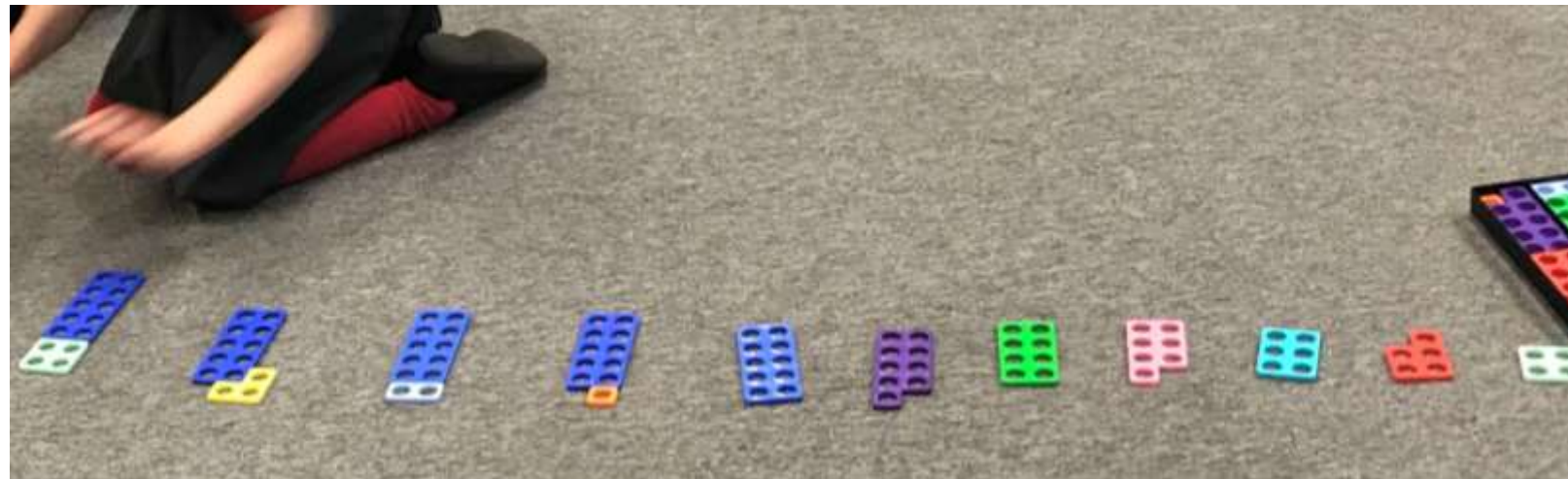
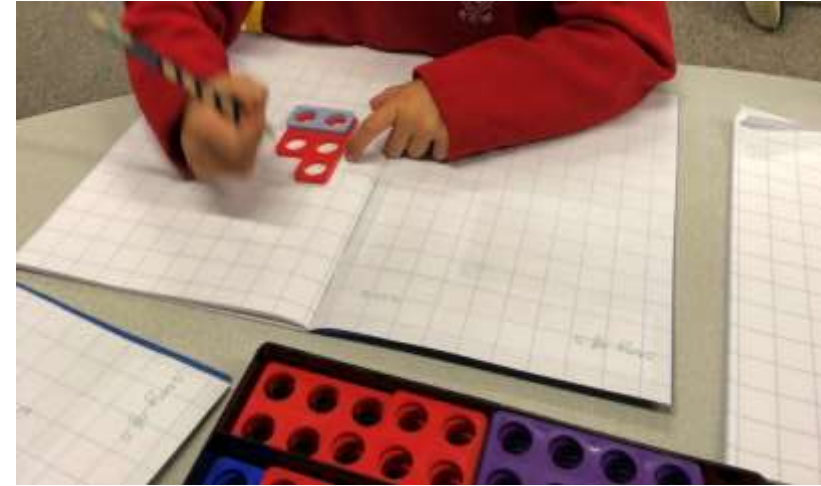
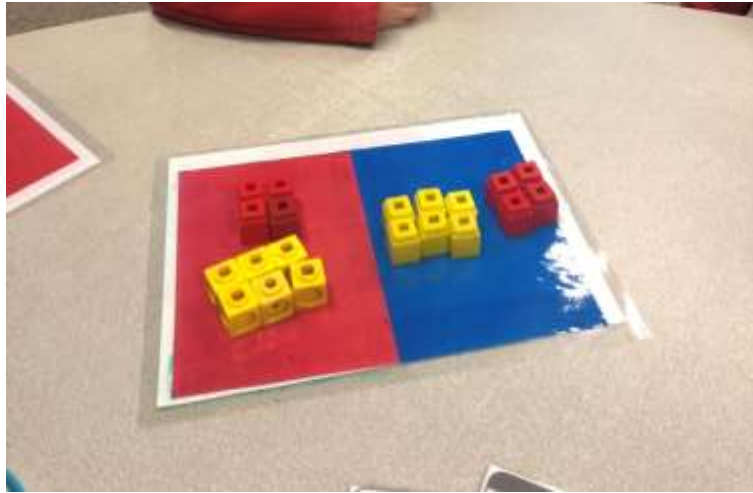
Manipulatives



| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |



Manipulatives



Concrete \longrightarrow **Pictorial** \longrightarrow **Abstract**

A diagram showing a large box labeled '4 whole' connected to two smaller boxes labeled '3 part' and '1 part'. To the right, a stack of 4 blocks (3 purple, 1 red) is shown.

A string of 19 red beads and a red heart with the numbers '1' and '9' written on it.

Colored sticks representing addition facts: 10=0, 9=2, 8=1, 7=3, 6=4, 5=6, 1=0, 2=1, 3=2.

A blue polka-dot card with a '10' label and two sections labeled 'part' containing 5 red dots and 5 yellow dots.

A 2x5 grid of red squares, with the top row containing 5 squares and the bottom row containing 5 empty squares.

Two rows of colored dot cards. The first row shows 10 = 1+9, 2+8, 3+7, 4+6. The second row shows 5+5, 6+4, 7+3, 8+2, 9+1.

A Part-Part-Whole diagram with 'Part' labels above two empty boxes and 'Whole' labeled below a larger empty box.

A 6x2 grid of boxes. Each box contains a dot pattern on the left and an empty space on the right. The dot patterns represent 10 = 5 + 5 in various arrangements (e.g., 5 dots in a row, 5 dots in a vertical line).

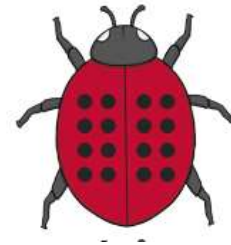
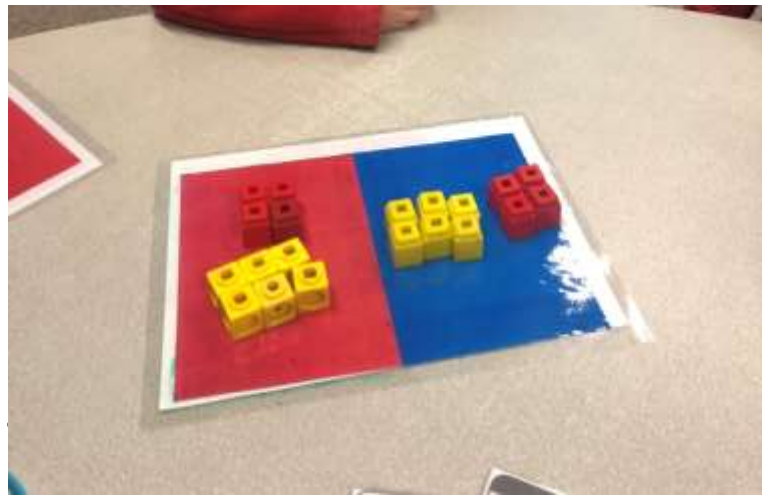
A ten-frame with a '6' above it and a '3' below it. The left side contains 6 black dots, and the right side is empty. Text: 'What's the missing part?'.

A ten-frame where each cell contains a number from 1 to 10, arranged in a specific pattern.



• Concrete

Pictorial



$8 + 8 = \underline{\hspace{2cm}}$

Sita earns £10 every time she helps her mum tidy the house. If she helps her mum 2 times, how much money does she earn?

Mastering Early Number



NCETM Maths Hub: Mastering Early Number

- 5x 1 hour maths lessons each week – National Curriculum/ White Rose and NCETM to support teaching
- 4x 15 minute 'Early Maths Mastery'
 - This project aims to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave KS1 with fluency in calculation and a confidence and flexibility with number.

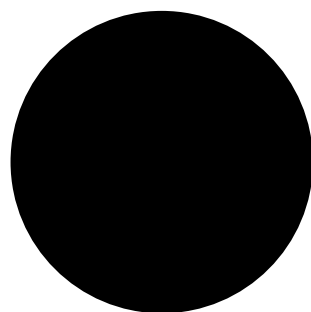
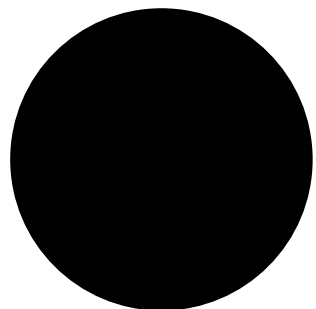
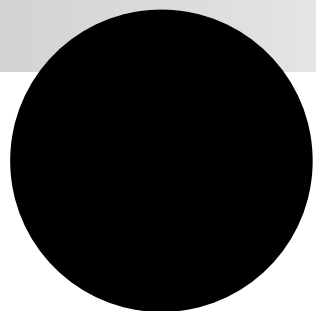
<https://www.ncetm.org.uk/maths-hubs-projects/mastering-number-at-reception-and-ks1/>

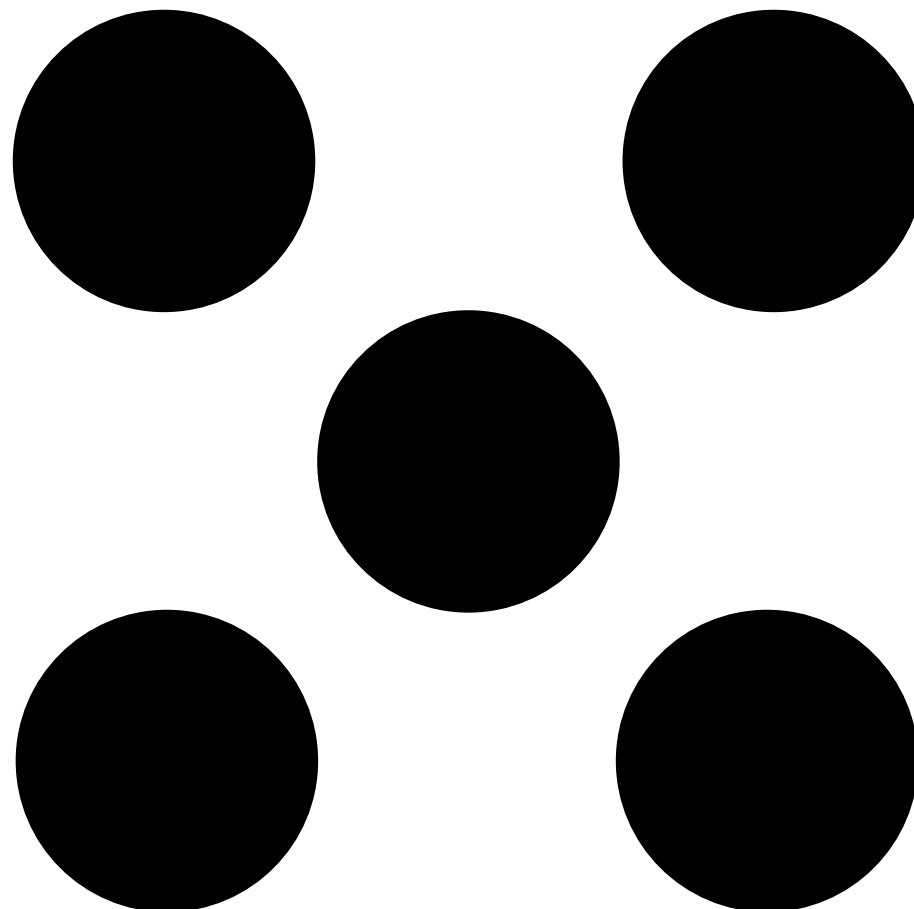
Mastering Early Number

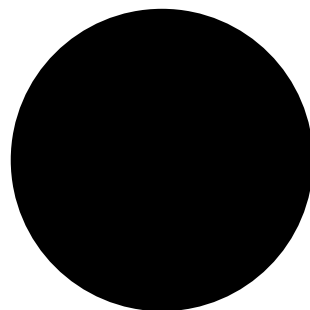
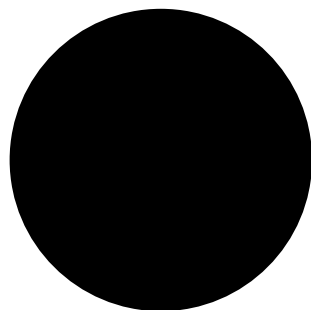
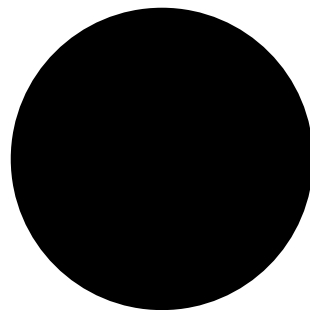
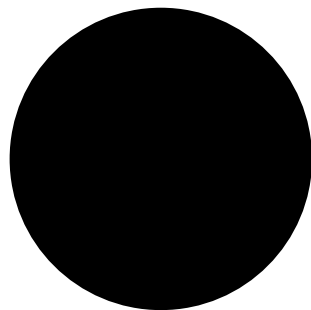


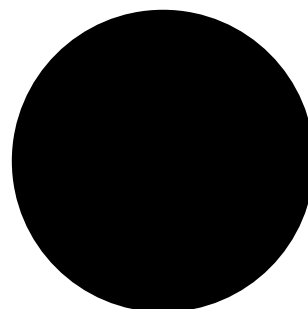
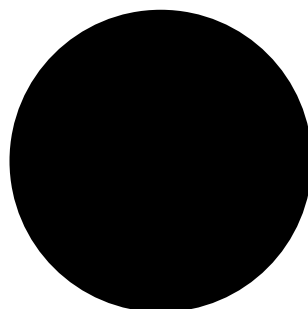
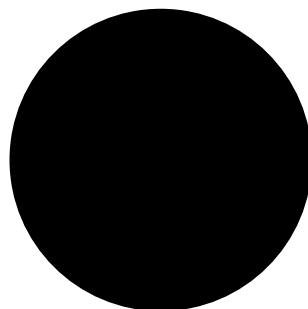
Subitising

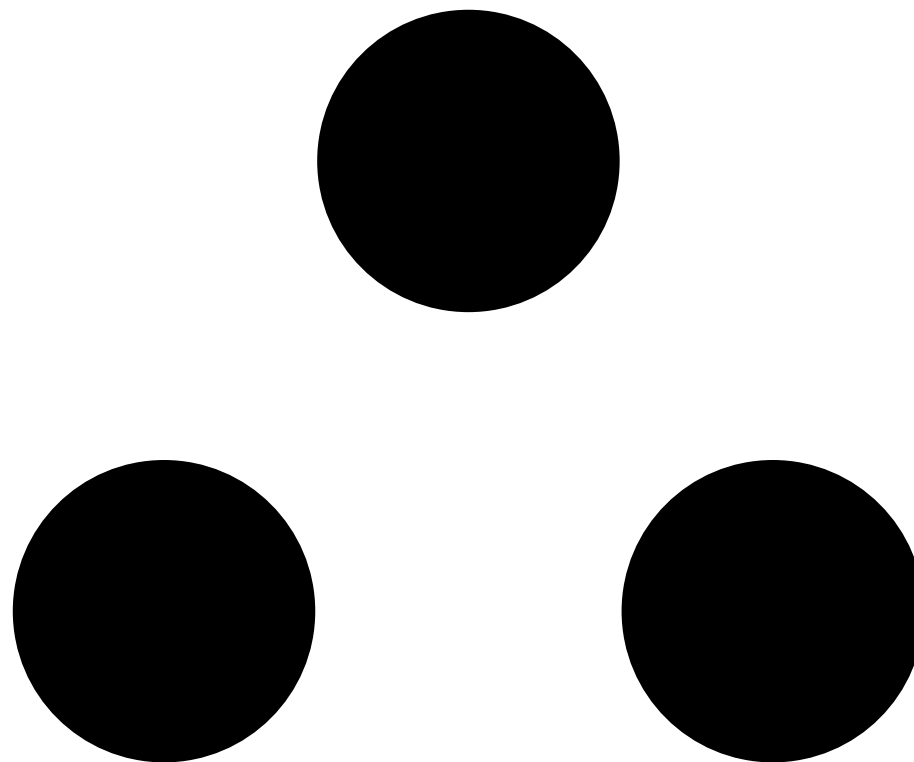
The way of recognising the quantity of something, without counting.

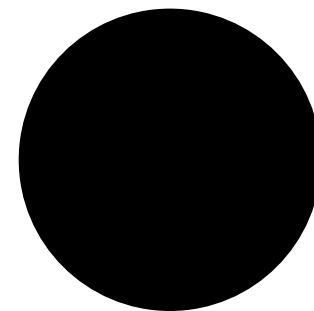
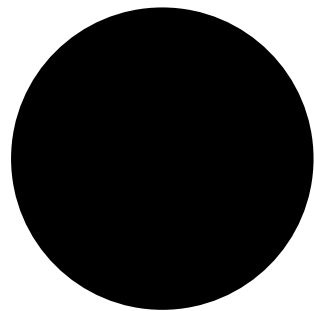
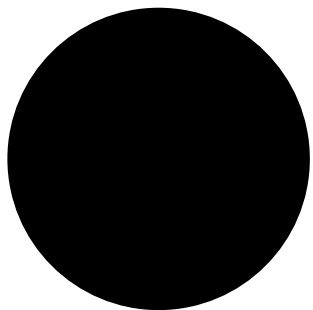


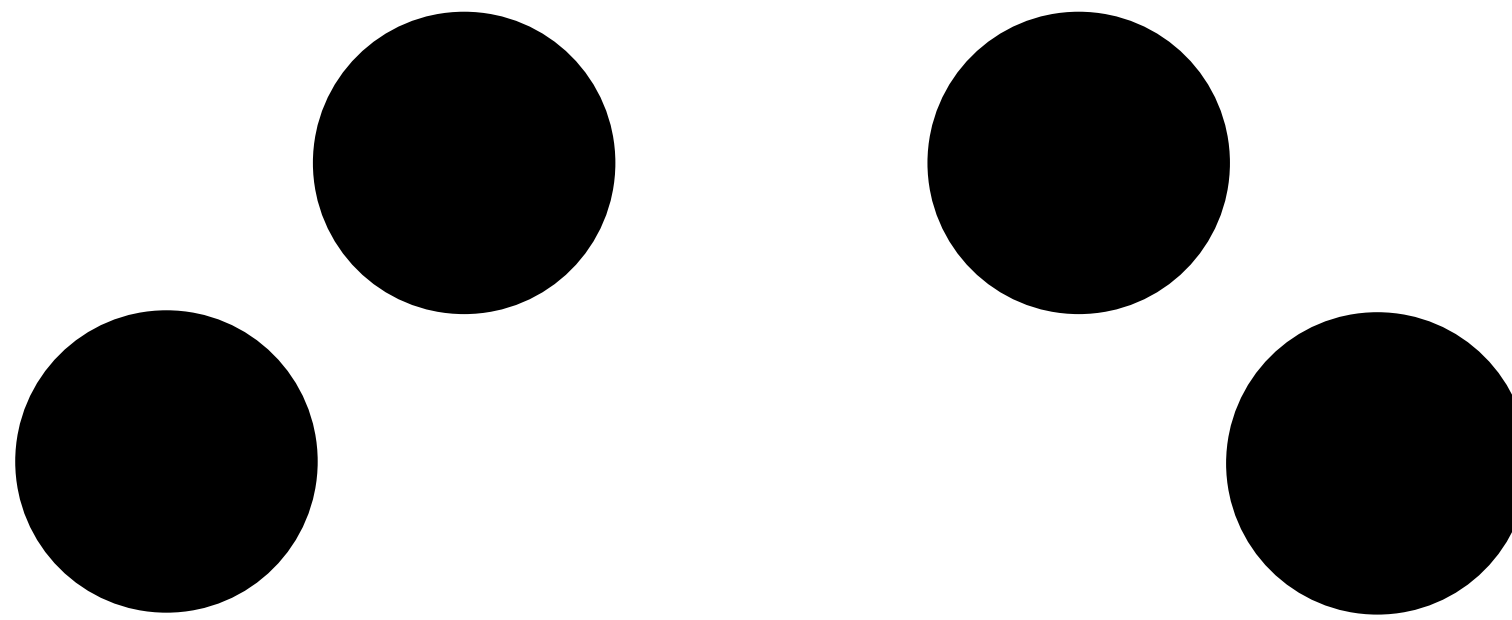


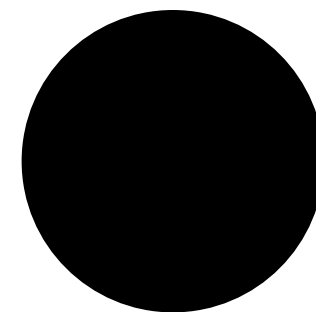
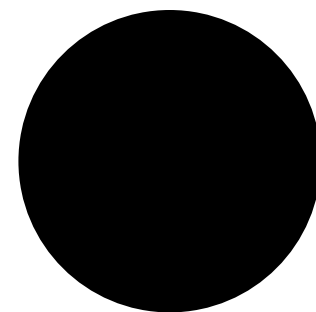
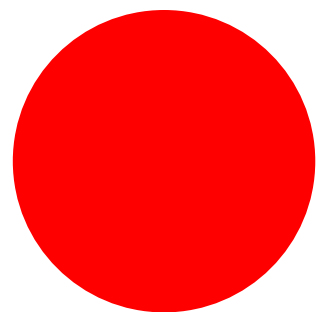
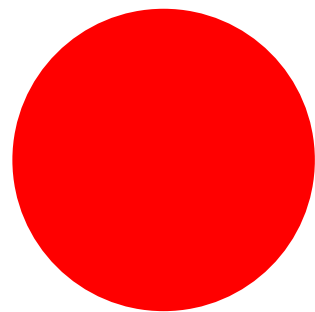
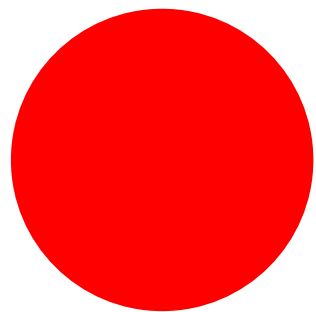


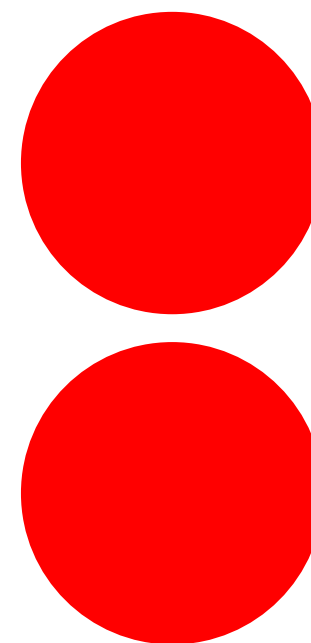
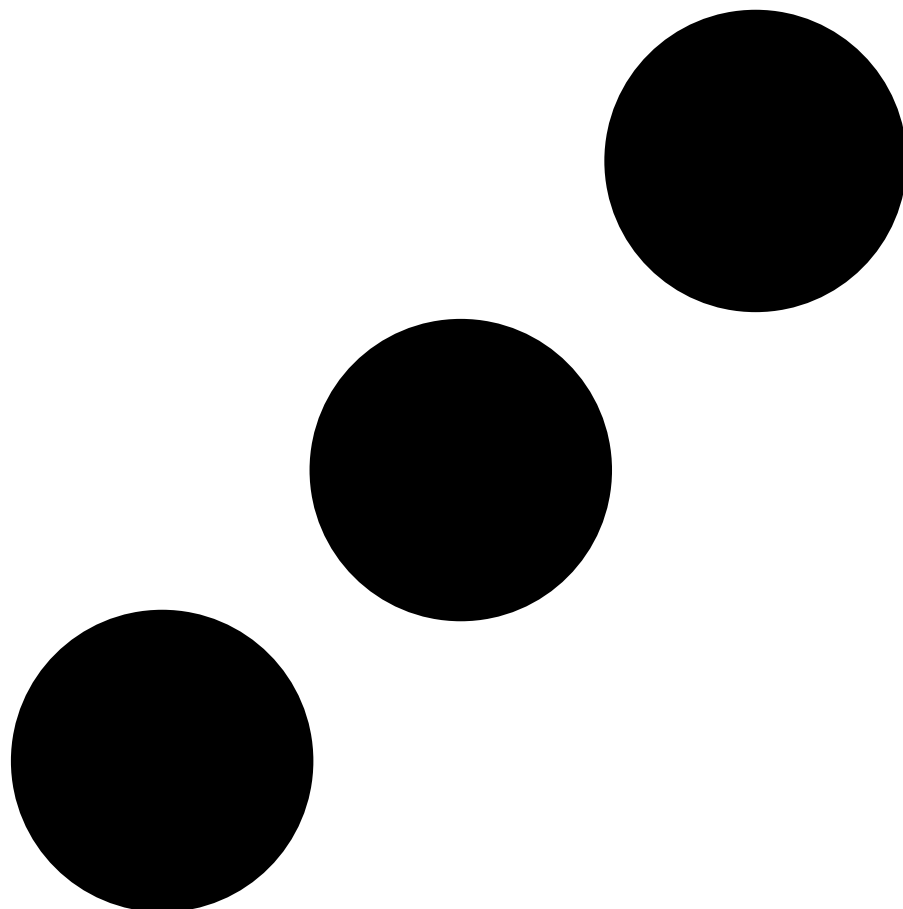




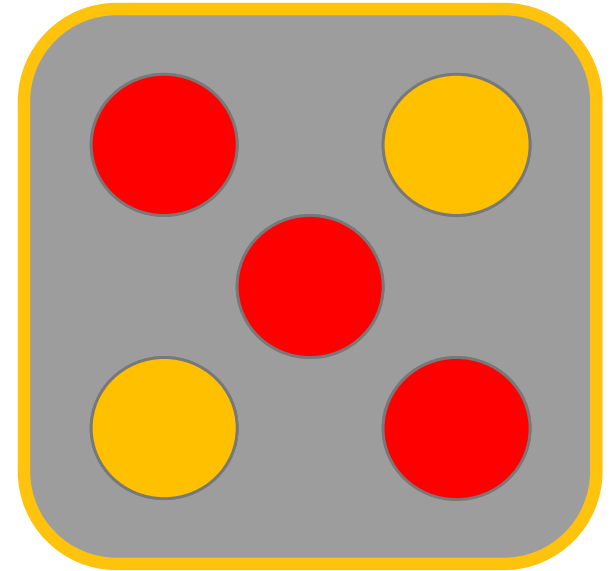
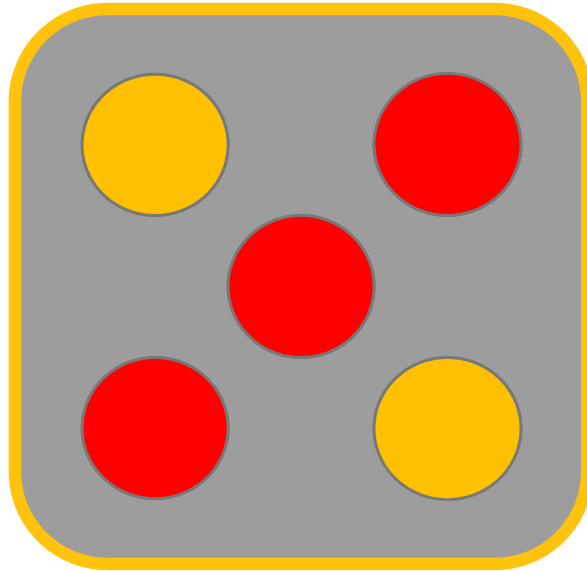
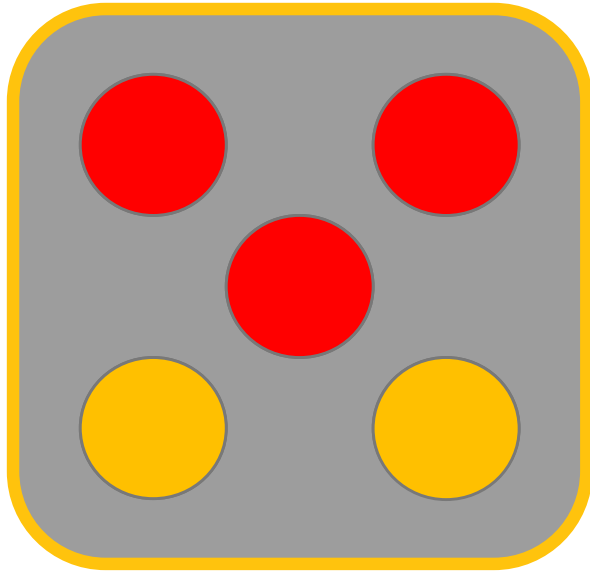
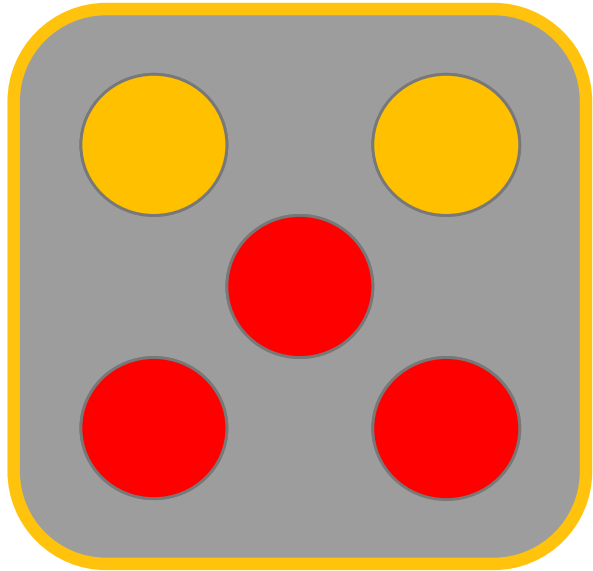








What is the same? What is different?
Which pictures are most similar?



Mastering Early Number

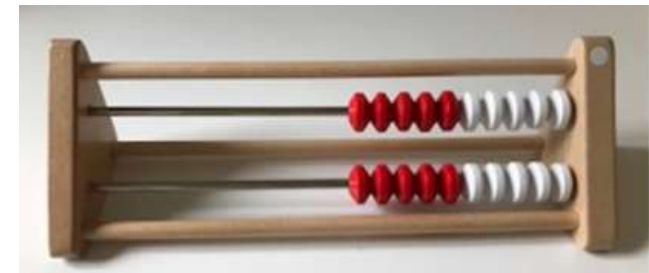
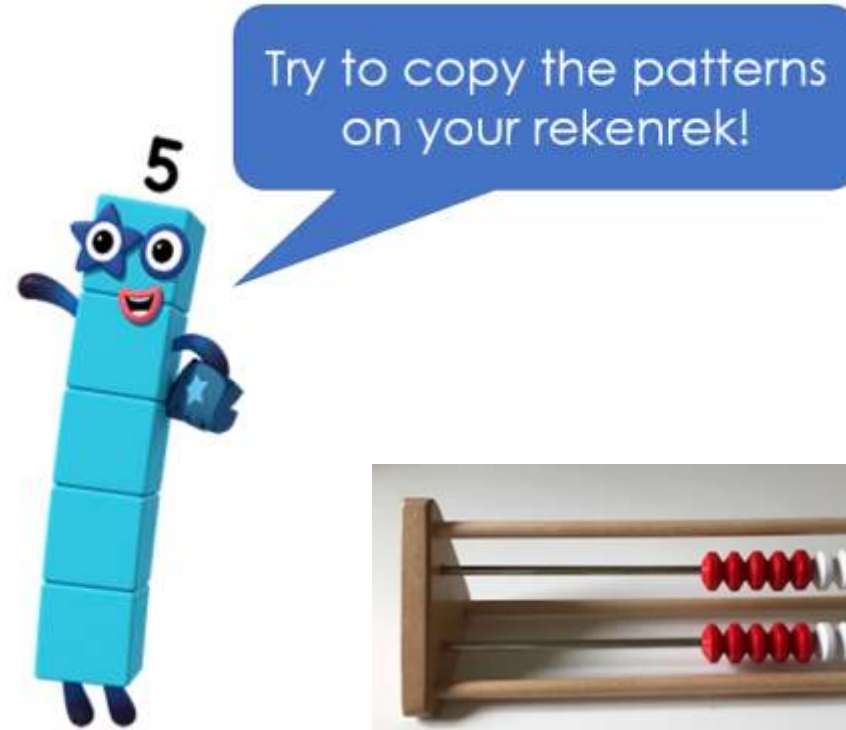
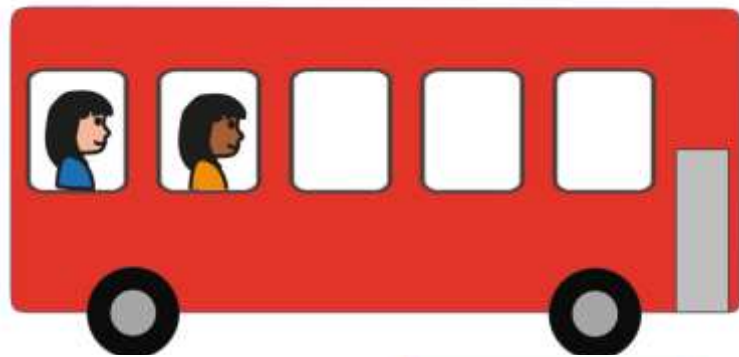


Rekenrek

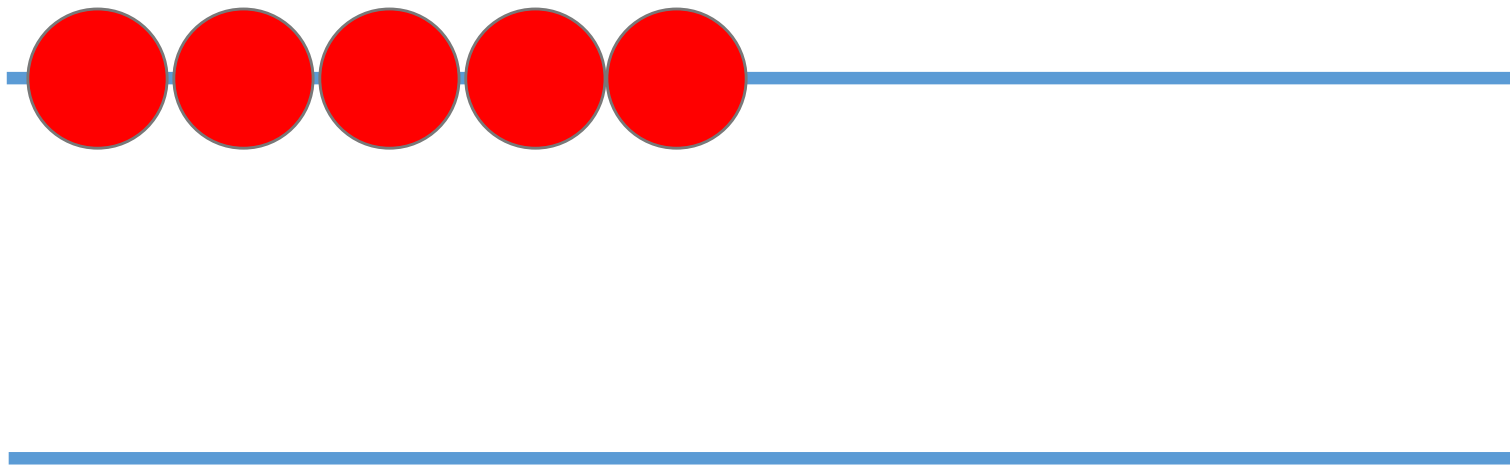
- Exposes mathematical structure for all children
- It highlights the 5 and 10
- Children can 'see' relationships
- Encourages children to be mathematically observant
- It encourages subitising



Rekenrek



Can you work systematically to show all the ways to make 5?



How many on the bottom row to make 5?



_____ and _____ make 5.

For each expression, show 1 number on the top row and 1 number on the bottom row of your rekenrek.



$4 < 7$

$7 < 9$

$7 > 4$

$9 > 7$

_____ is greater than _____ ;
_____ is less than _____ .

True or false? Convince me!



$$8 > 4$$

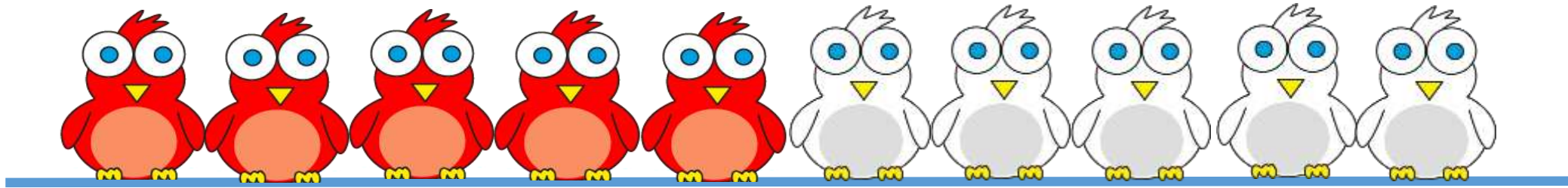


True or false? Convince me!



$$9 > 5 + 4$$

Show on your rekenrek and your fingers HOW MANY MORE birds are needed to make 12



_____ needs _____ to make 10;
10 needs _____ to make _____;
so, _____ needs _____ to make _____.

Place Value

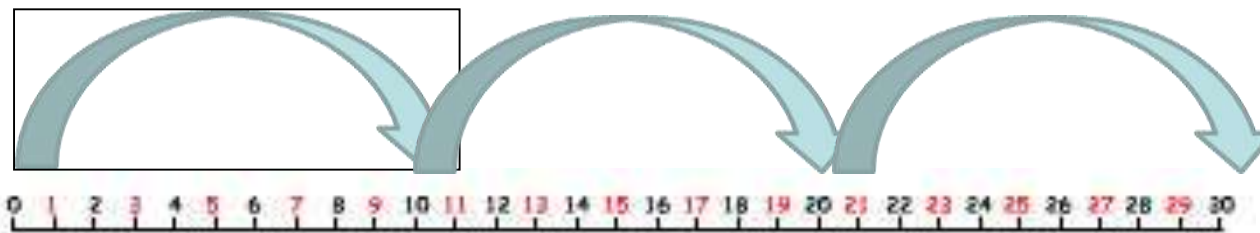
Early Years

- Matching
- Identifying
- Grouping



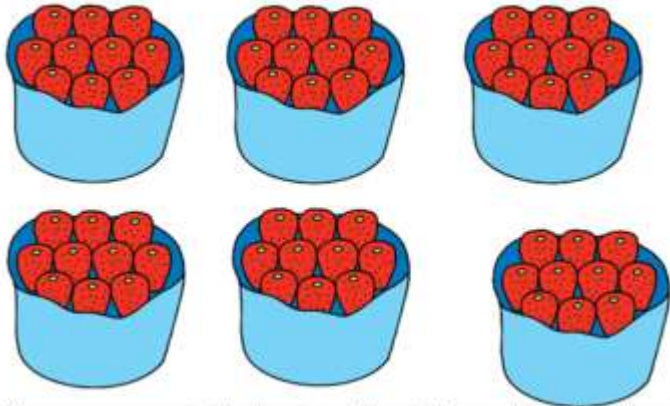
Years One and Two

- Partitioning
- Place value
- Use and apply this knowledge to problem solve.



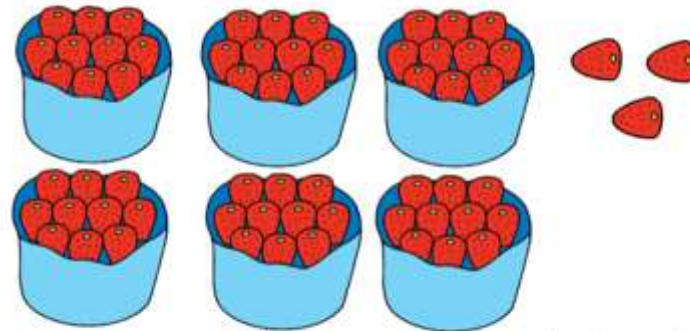
Place value

How many strawberries did I buy?



Who can come up to the front and show this number using dienes?

What if I bought three more strawberries?

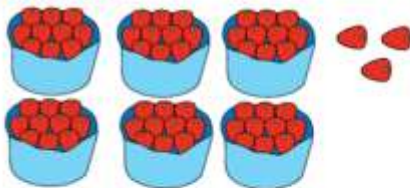


How could we write this as a calculation?

Key maths sentence:



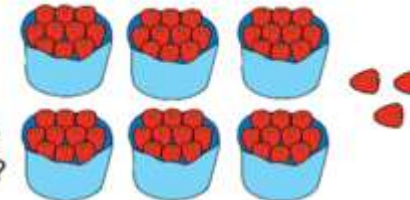
"63 is 60 and 3, which is six tens and three ones."



Calculation:

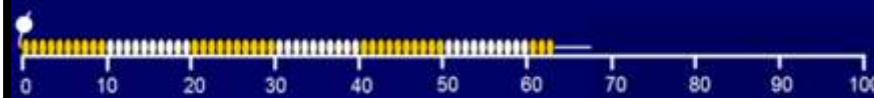
$$63 = 60 + 3$$

How can we show 63 strawberries on the number line?



How many jumps of ten do we need?
How many jumps of one do we need?

Draw the jumps of ten from 0-60, then three jumps of one.

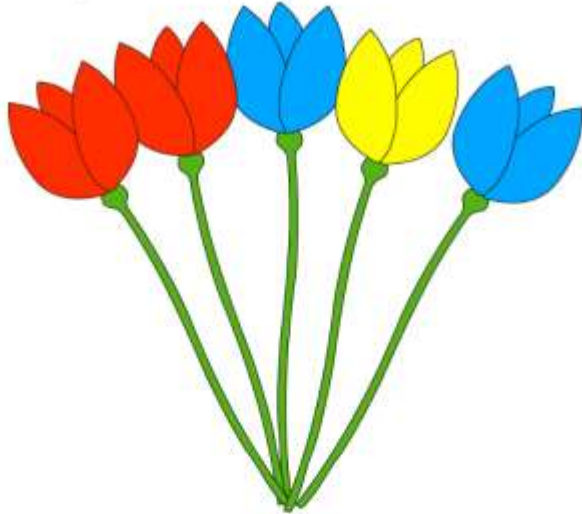


Now, draw jumps for this number.

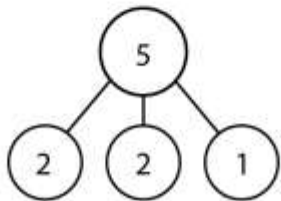


Partitioning – the beginning

Partitioning into three parts:

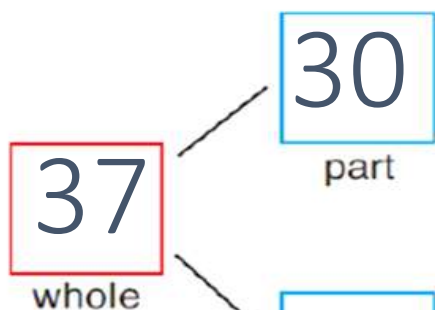


'There are five flowers. Two are red, two are blue and one is yellow.'



'Five is the whole; two is a part, two is a part and one is a part.'

Place value the next step....

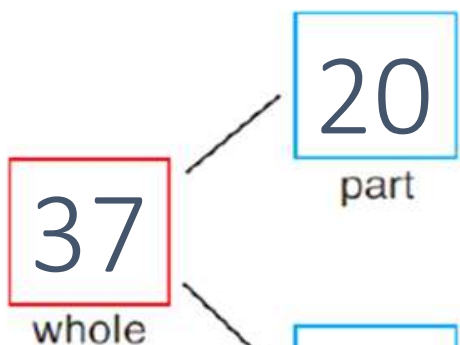


3 tens

7 ones

What's the odd one out?

71, 77, 17, 70



2 tens

17 ones

Miss Platt bought 65 apples and Mr Ellimouni bought 59 apples.

Mr Ellimouni bought more apples.

True or False?

Number Bonds

Fluency

Reasoning

**Problem
solving**

Concrete 
Pictorial 
Abstract 

Reception

Children use quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing

Year One

To show and use number bonds to 20. In addition and subtraction.

Year Two

I can recall and use + and - facts to 20 and use number facts to 100

To apply mental strategies to problems

To apply written strategies to problems

Number Bonds

Number Bonds

Story to 10

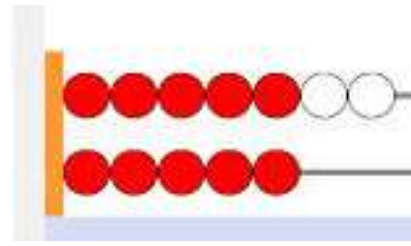
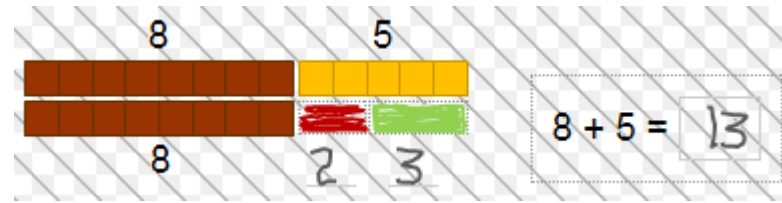
| | | |
|--|---|--|
| Story of 2 $0+2=2$ $1+1=2$ $2+0=2$ | Story of 3 $0+3=3$ $1+2=3$ $2+1=3$ $3+0=3$ | Story of 4 $0+4=4$ $1+3=4$ $2+2=4$ $3+1=4$ $4+0=4$ |
| Story of 5 $0+5=5$ $1+4=5$ $2+3=5$ $3+2=5$ $4+1=5$ $5+0=5$ | Story of 6 $0+6=6$ $1+5=6$ $2+4=6$ $3+3=6$ $4+2=6$ $5+1=6$ $6+0=6$ | Story of 7 $0+7=7$ $1+6=7$ $2+5=7$ $3+4=7$ $4+3=7$ $5+2=7$ $6+1=7$ $7+0=7$ |
| Story of 8 $0+8=8$ $1+7=8$ $2+6=8$ $3+5=8$ $4+4=8$ $5+3=8$ $6+2=8$ $7+1=8$ $8+0=8$ | Story of 9 $0+9=9$ $1+8=9$ $2+7=9$ $3+6=9$ $4+5=9$ $5+4=9$ $6+3=9$ $7+2=9$ $8+1=9$ $9+0=9$ | Story of 10 $0+10=10$ $1+9=10$ $2+8=10$ $3+7=10$ $4+6=10$ $5+5=10$ $6+4=10$ $7+3=10$ $8+2=10$ $9+1=10$ $10+0=10$ |

| | |
|--|---|
| Doubles $1+1=2$ $2+2=4$ $3+3=6$ $4+4=8$ $5+5=10$ | Odd and Even $6+6=12$ $7+7=14$ $8+8=16$ $9+9=18$ $10+10=20$ |
|--|---|

If I know $5+5=10$...
 What else do I know?



Memorising facts
 Using facts
 Patterns and connections
 Generalising
 'How many ways can you make 7?'



- 1 + 9
- 2 + 8
- 3 + 7
- 4 + 6
- 5 + 5
- 6 + 4
- 7 + 3
- 8 + 2
- 9 + 1

Prompting thinking everyday



- Show me...
- Here is the answer – what could the question have been?
- Odd one out
- Find the mistake and how it went wrong
- Can you see a pattern?
- True or false?
- Always true? Sometimes true? Never true?
 - Does an even number always end in 2?

Useful Links



NCETM National Centre for Excellence in the Teaching of Mathematics

<https://www.ncetm.org.uk/>

NCETM National Curriculum Glossary

<https://www.ncetm.org.uk/media/hpihrj3s/national-curriculum-glossary.pdf>

Nrich

<http://nrich.maths.org/frontpage>

I See Reasoning

<https://www.iseemaths.com/i-see-reasoning-ks1/>