Mastery Maths
Parent Workshop

7th February 2pm
10th February 6pm

Mastery of Mathematics is…..

- Achievable for all
- Deep and sustainable learning
- The ability to build on something that has already been sufficiently mastered
- The ability to reason about a concept and make connections
- Conceptual and procedural fluency

Teaching for Mastery

- The belief that all pupils can achieve
- Keeping the class working together so that all can access and master mathematics
- Development of deep mathematical understanding
- Development of both factual/procedural and conceptual fluency
- Longer time on key topics, providing time to go deeper and embed learning

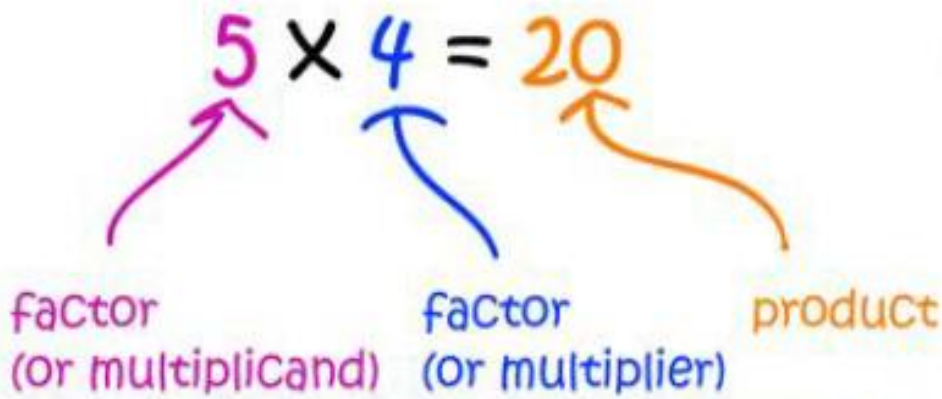
What does it mean to master something?

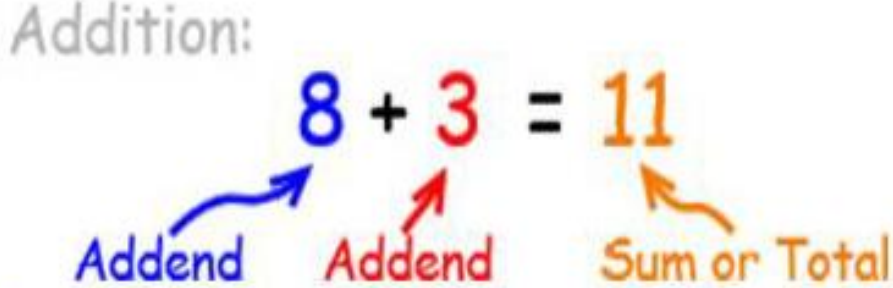
If you drive a car, imagine the process you went through…

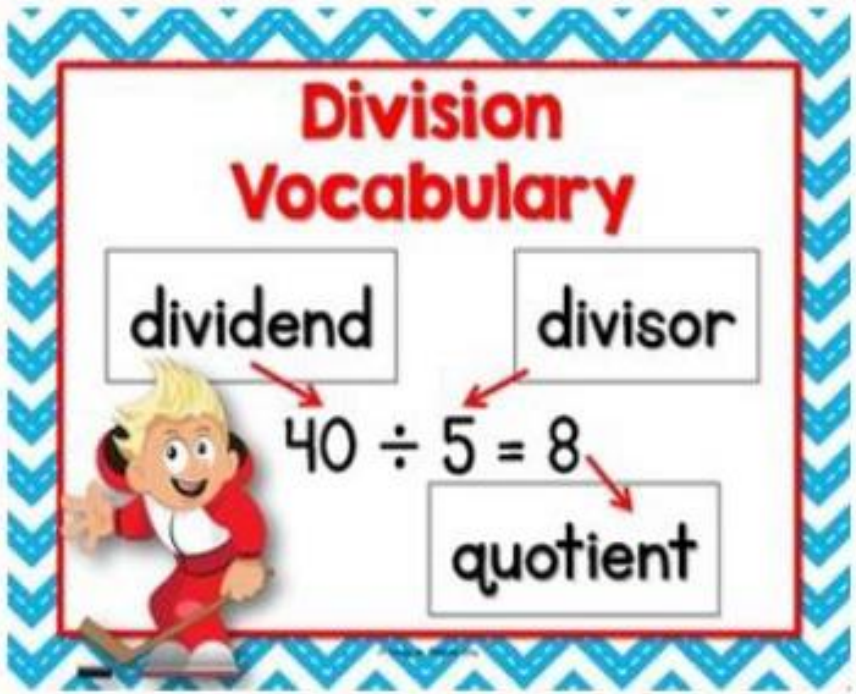
- The very first drive, lacking knowledge of what to do to get moving
- The practice, gaining confidence that you are able to drive
- The driving test, fairly competent but maybe not fully confident
- A few years on, it’s automatic, you don’t have to think about how to change gears or use the brake
-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

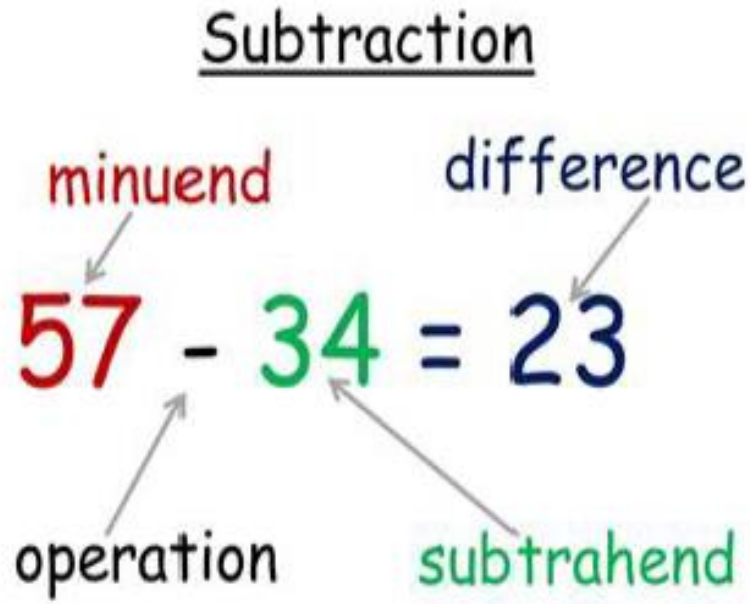
In the past ....

- Children who were quick graspers were being accelerated quickly through the curriculum without allowing them to secure a deep understanding of each concept.
- Children who struggled with maths were given easier tasks and did not always access the same curriculum that the quick graspers did.
- As a result children had large gaps in their mathematical understanding.


5 × 4 = 20
factor
(or multiplicand)
factor
(or multiplier)
product


Addition:
8 + 3 = 11
Addend
Addend
Sum or Total


Division
Vocabulary
dividend
divisor
40 ÷ 5 = 8
quotient


Subtraction
minuend
difference
57 - 34 = 23
operation
subtrahend

Mathematical fluency – what is it?

15 x 12 = 180

How could we solve this?

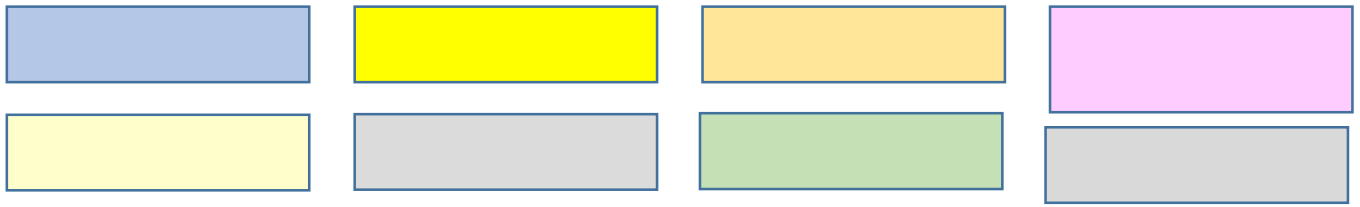
Fluency is the ability to make connections and select the most appropriate/ efficient methods.

Fluency is more than memorising facts

To become fluent mathematicians, children need to develop:

- an understanding of the meaning of the operations and their relationships to each other. E.g. inverse operations.
- an understanding number relationships. E.g. 4×5 is related to 4×50.
- confident use of calculating with 10, 100 and 1000. E.g. $24 + 10 = 34$ or $24 \times 10 = 240$.

Learning number facts
What addition facts do children need to know by the end of Year 2?



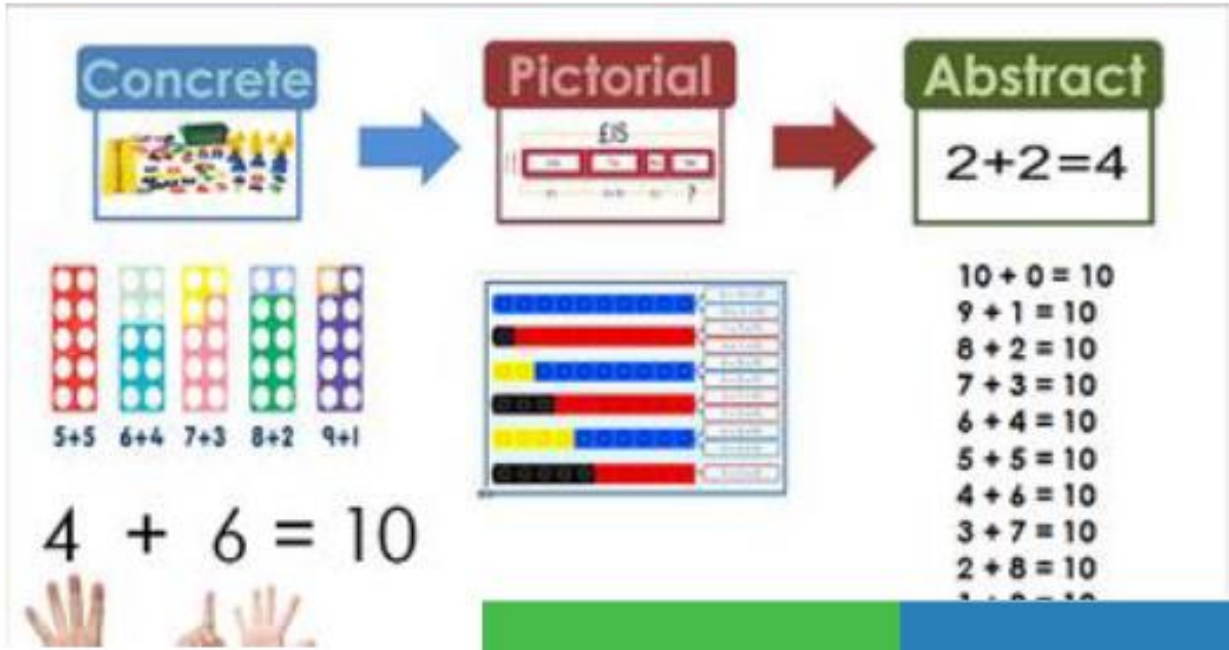
Y1 facts

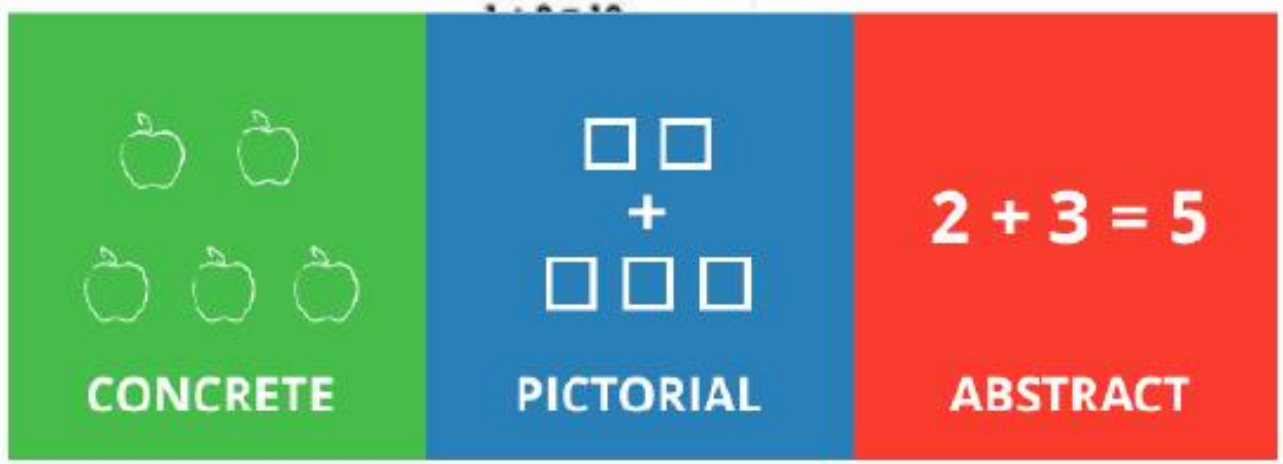
Y2 facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0 + 0	0 + 1	0 + 2	0 + 3	0 + 4	0 + 5	0 + 6	0 + 7	0 + 8	0 + 9	0 + 10
1	1 + 0	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 0	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 0	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10
4	4 + 0	4 + 1	4 + 2	4 + 3	4 + 4	4 + 5	4 + 6	4 + 7	4 + 8	4 + 9	4 + 10
5	5 + 0	5 + 1	5 + 2	5 + 3	5 + 4	5 + 5	5 + 6	5 + 7	5 + 8	5 + 9	5 + 10
6	6 + 0	6 + 1	6 + 2	6 + 3	6 + 4	6 + 5	6 + 6	6 + 7	6 + 8	6 + 9	6 + 10
7	7 + 0	7 + 1	7 + 2	7 + 3	7 + 4	7 + 5	7 + 6	7 + 7	7 + 8	7 + 9	7 + 10
8	8 + 0	8 + 1	8 + 2	8 + 3	8 + 4	8 + 5	8 + 6	8 + 7	8 + 8	8 + 9	8 + 10
9	9 + 0	9 + 1	9 + 2	9 + 3	9 + 4	9 + 5	9 + 6	9 + 7	9 + 8	9 + 9	9 + 10
10	10 + 0	10 + 1	10 + 2	10 + 3	10 + 4	10 + 5	10 + 6	10 + 7	10 + 8	10 + 9	10 + 10

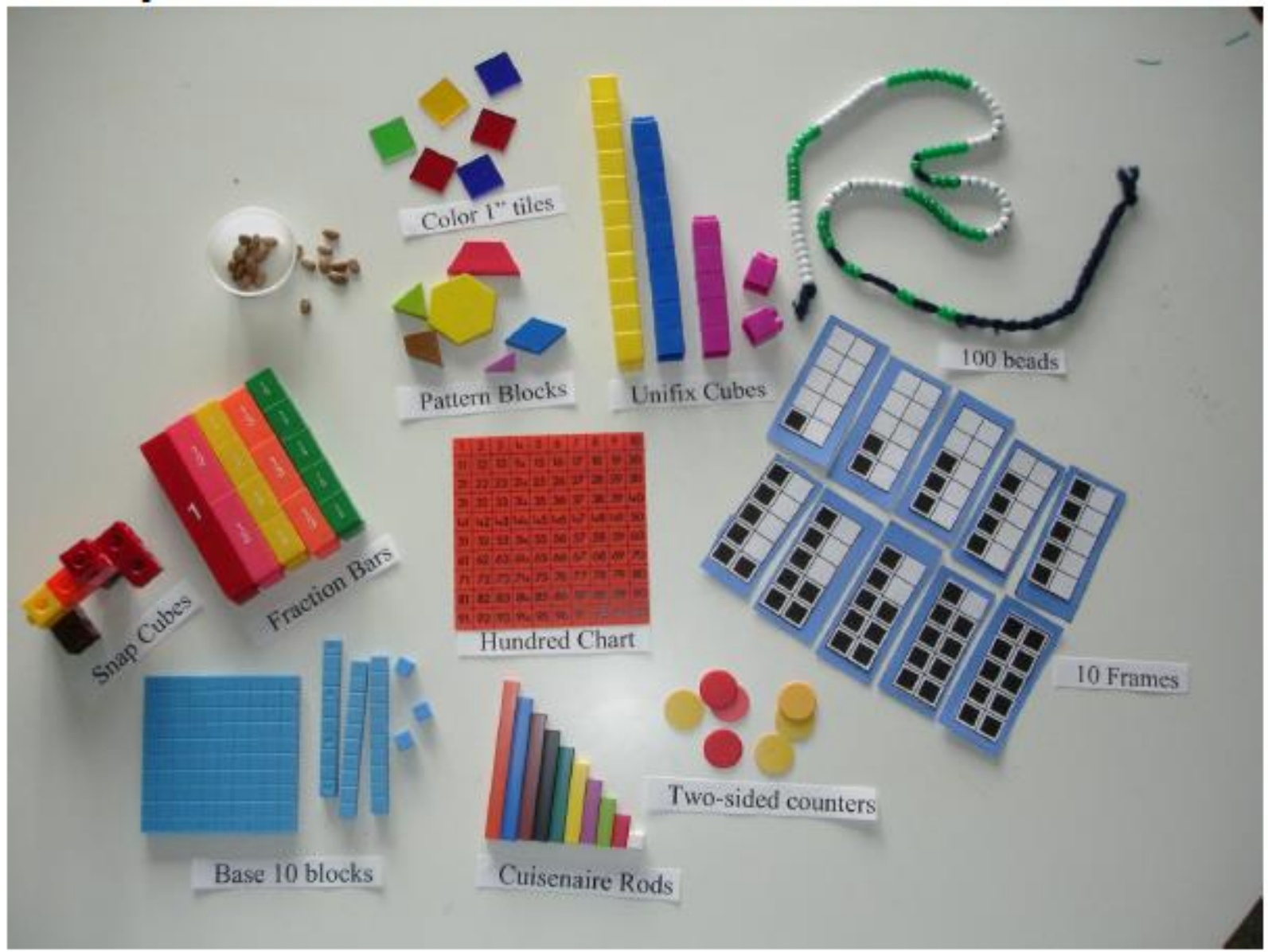
Children need different to learn different methods – not just memorise these facts. They will develop an understanding of which method is the most appropriate. E.g. near doubles.

Concrete and Pictorial Resources



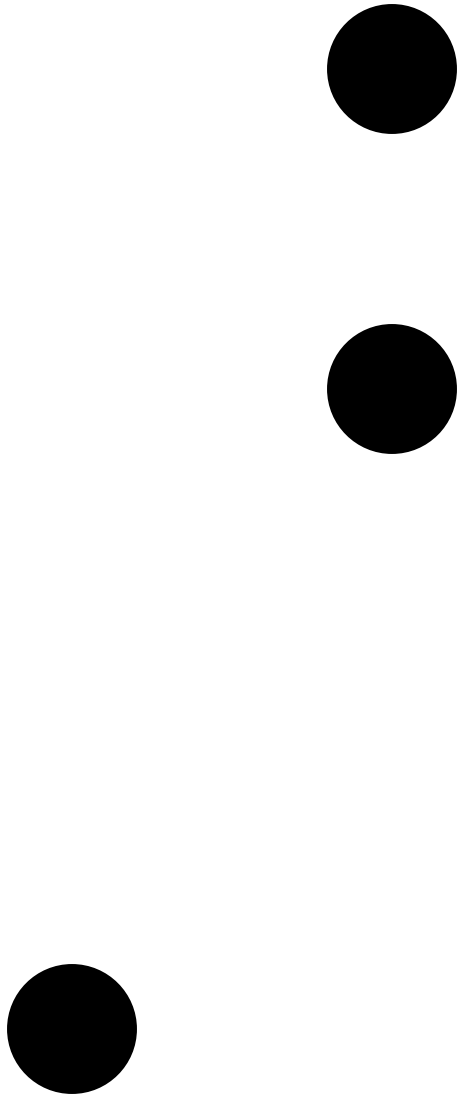


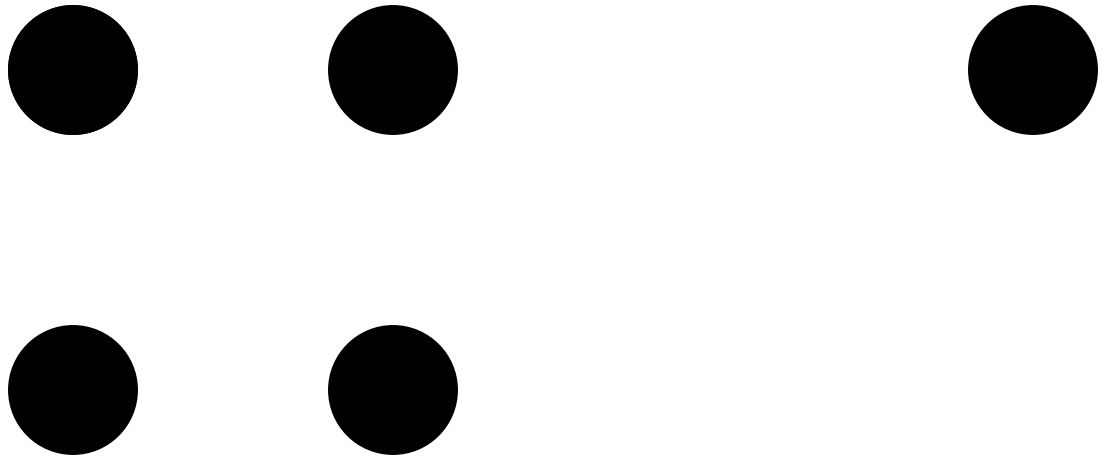
Representation and Structure

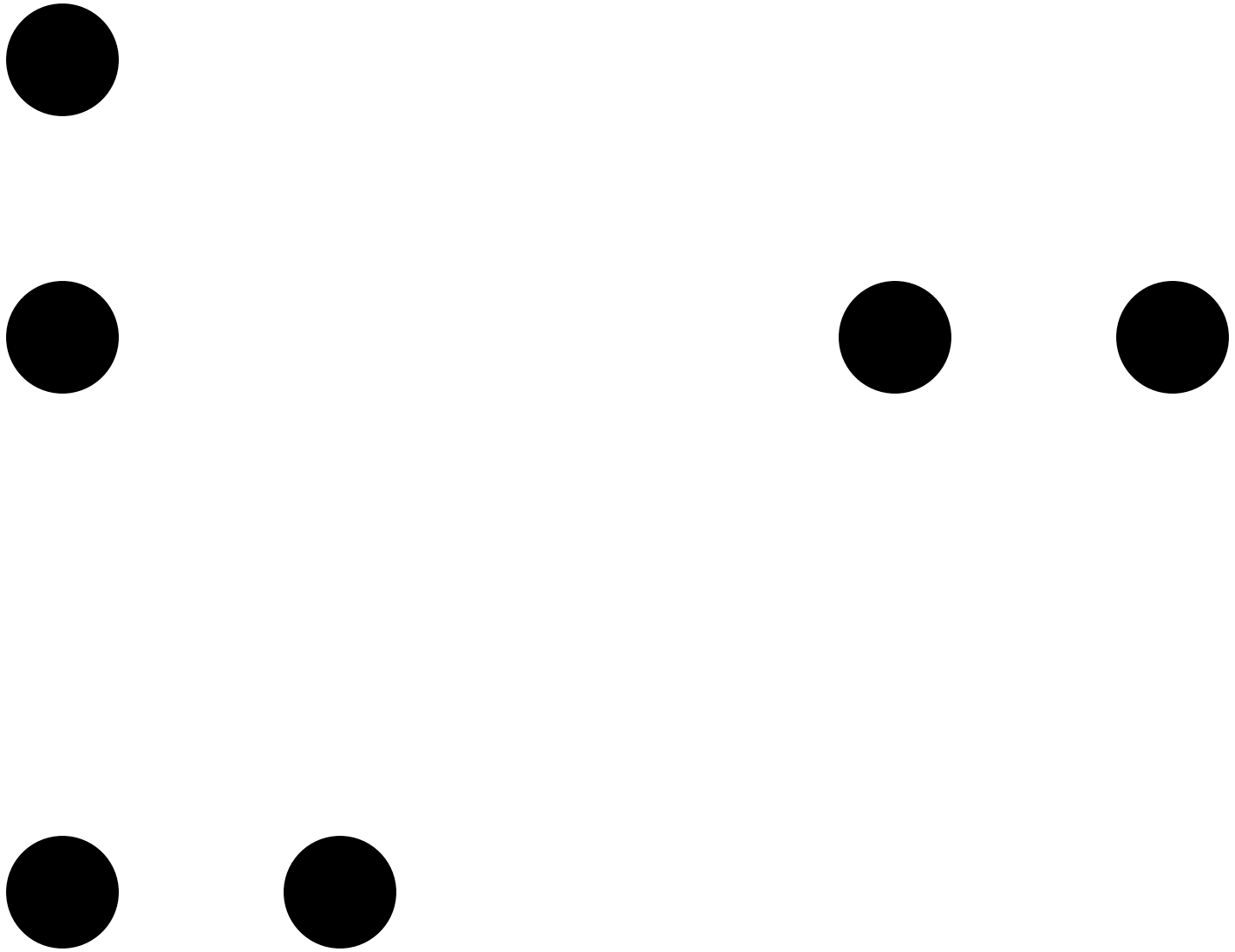


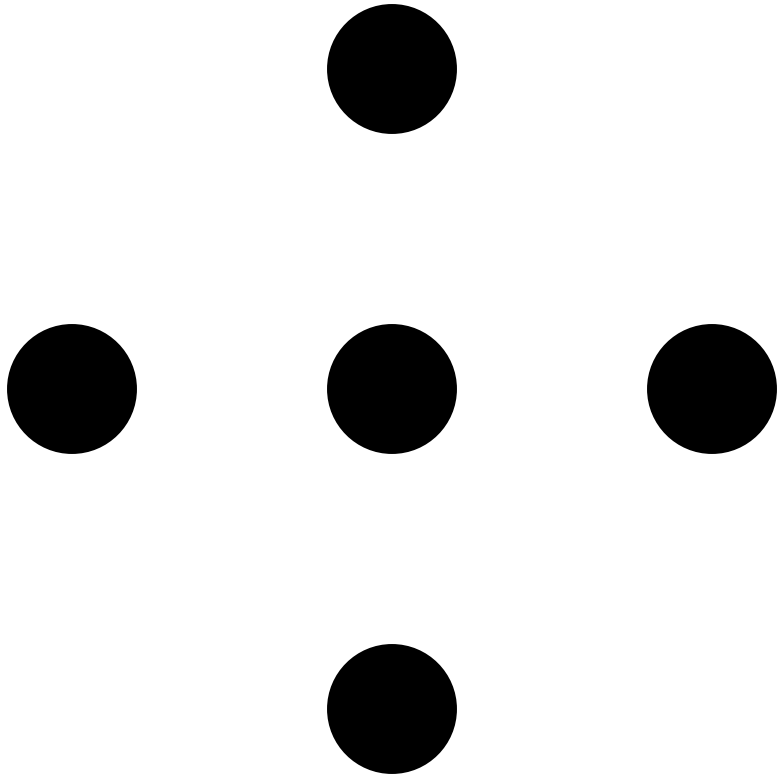
Subitising – counting in the Early Years

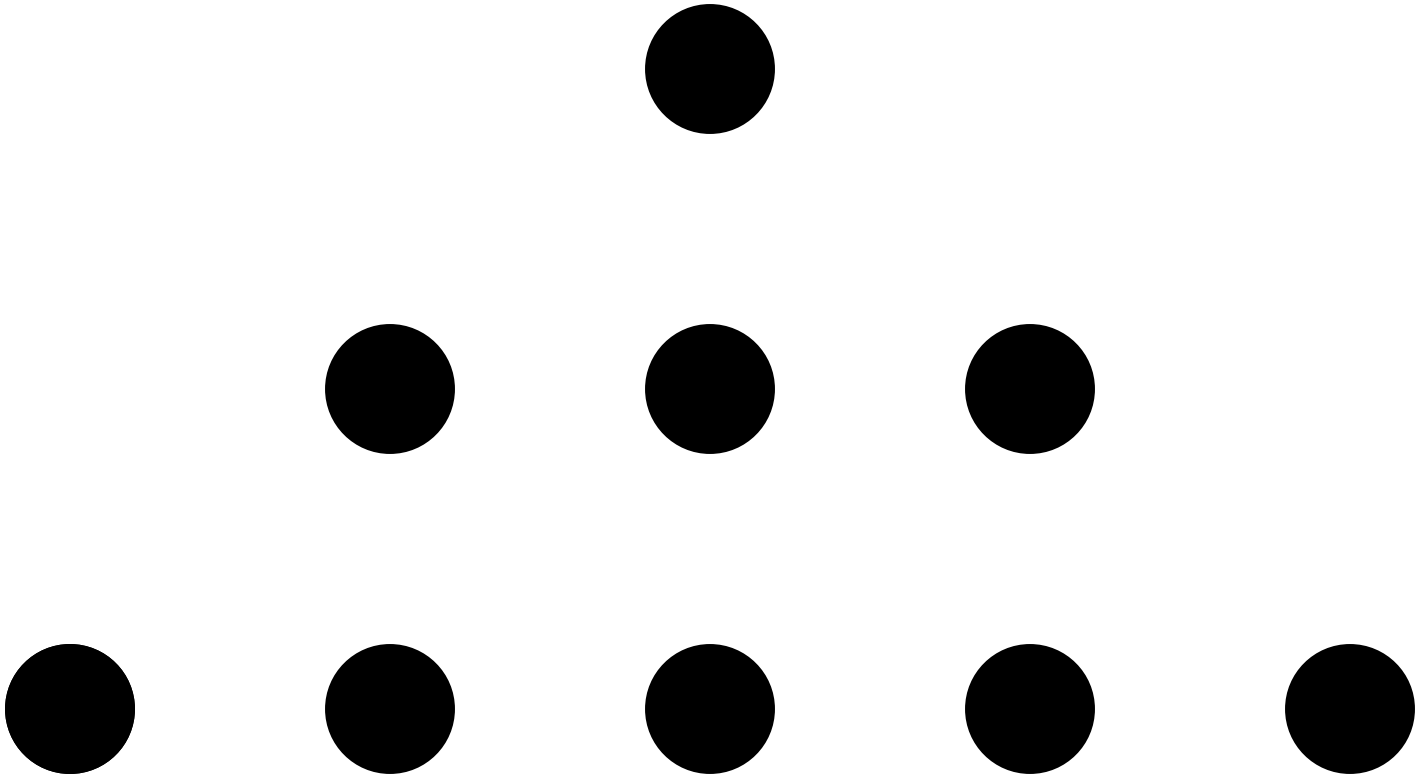
- The ability to instantly identify a set or group of objects without counting them (usually up to 6).





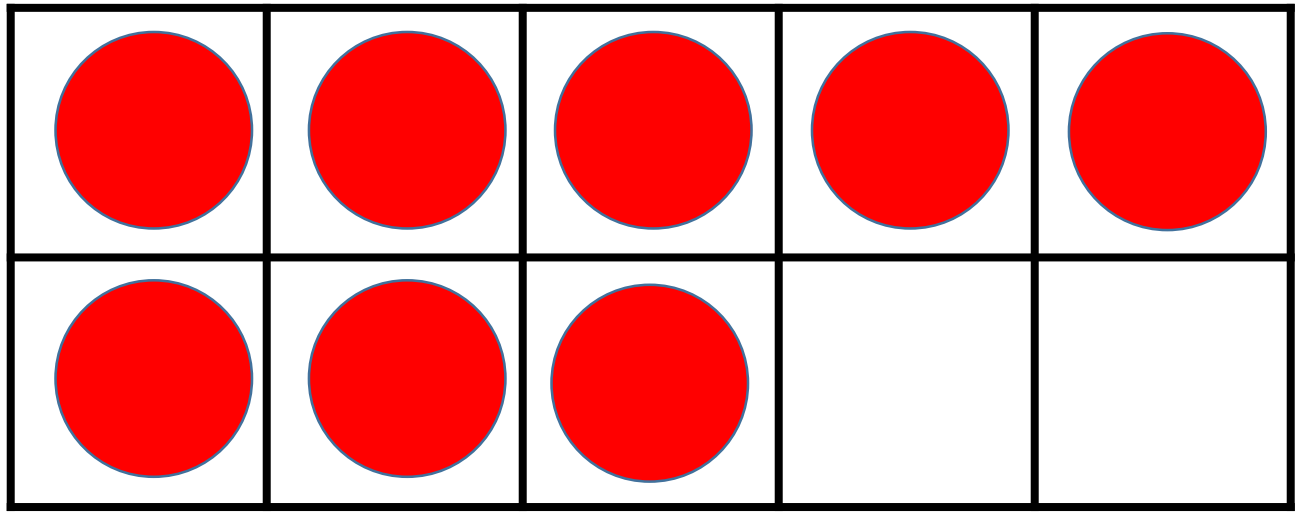


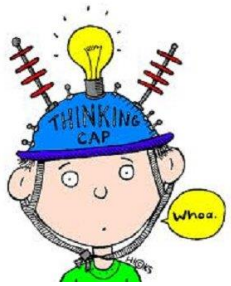


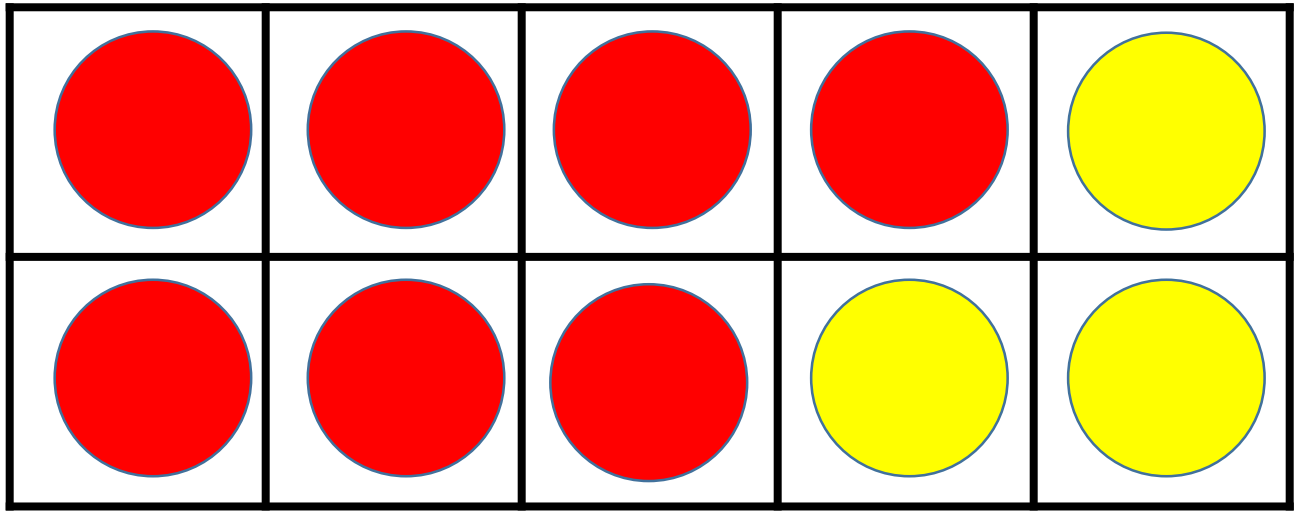


Ten Frame used to develop number sense and fluency

What do you see?



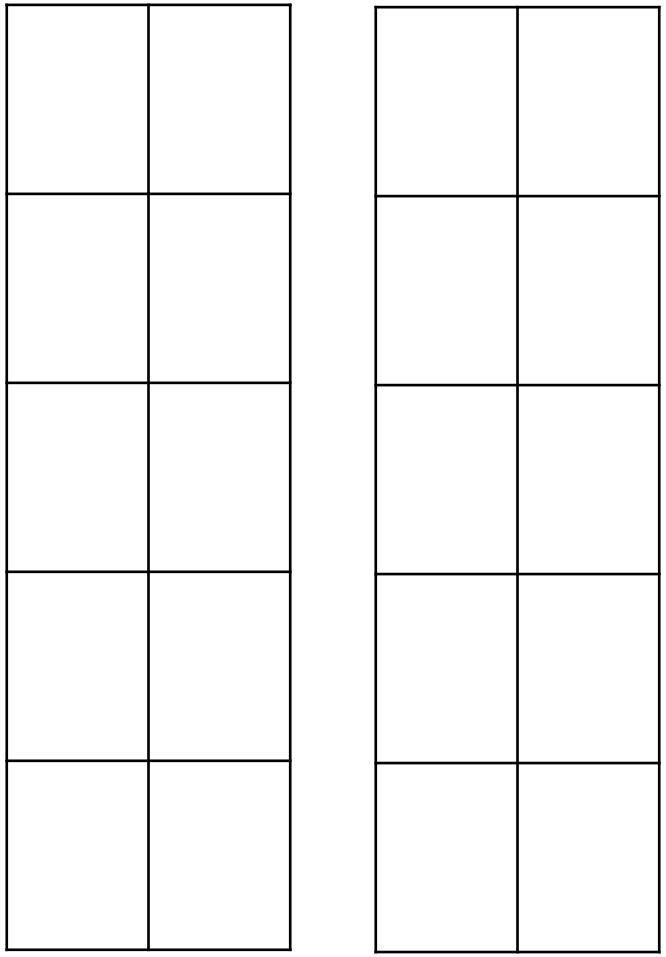




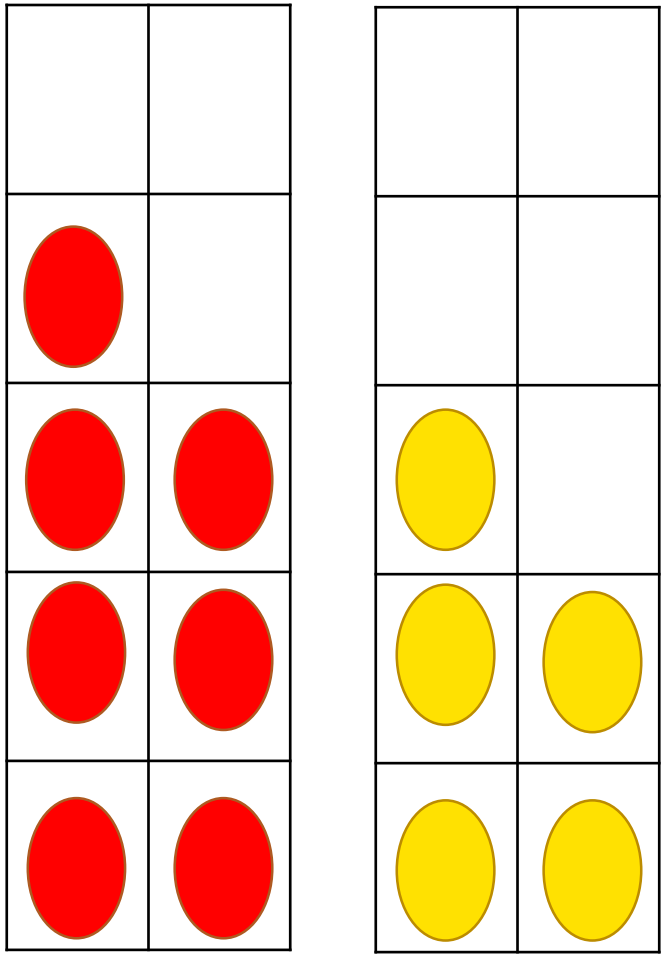
Bridging through 10

‘Make 10’

7 + 5

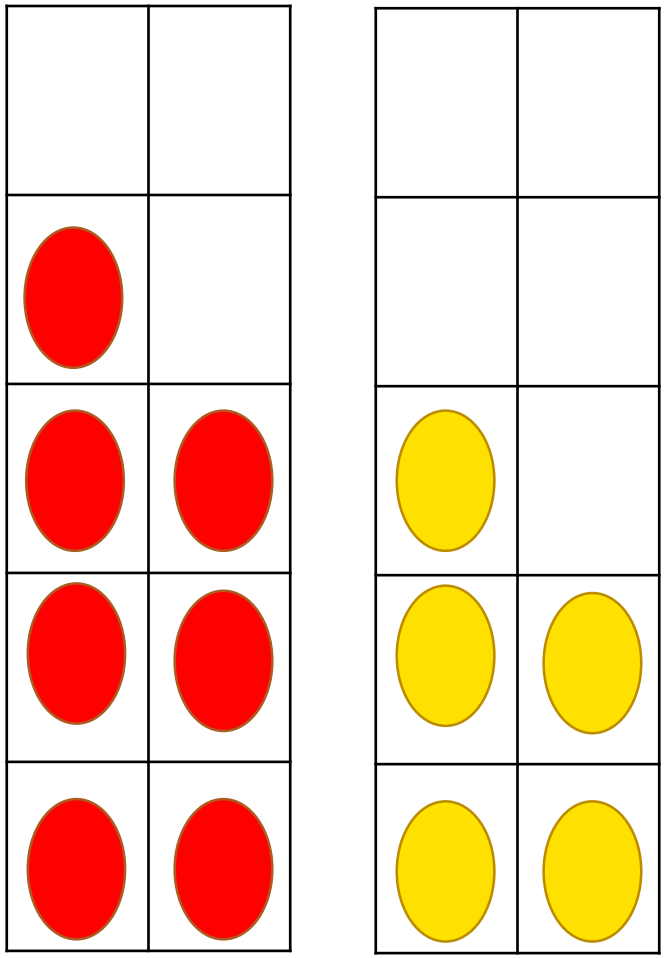


$7 + 5$



7 + 5

3 2



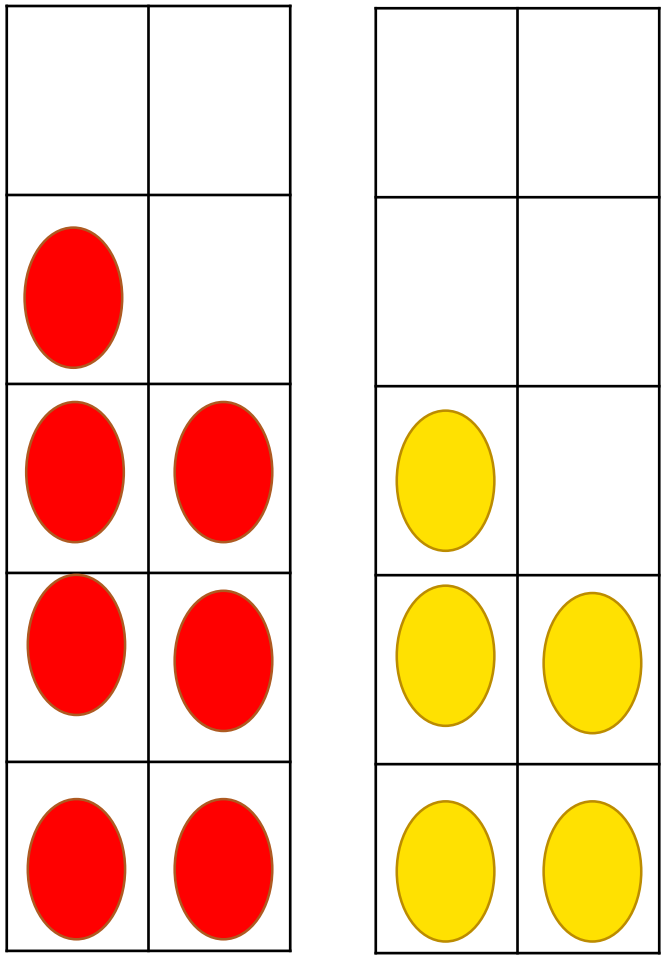
7+ 3+ 2

10 + 2

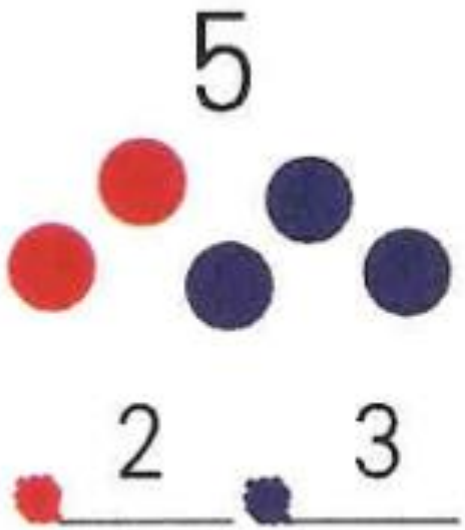
7+ 5

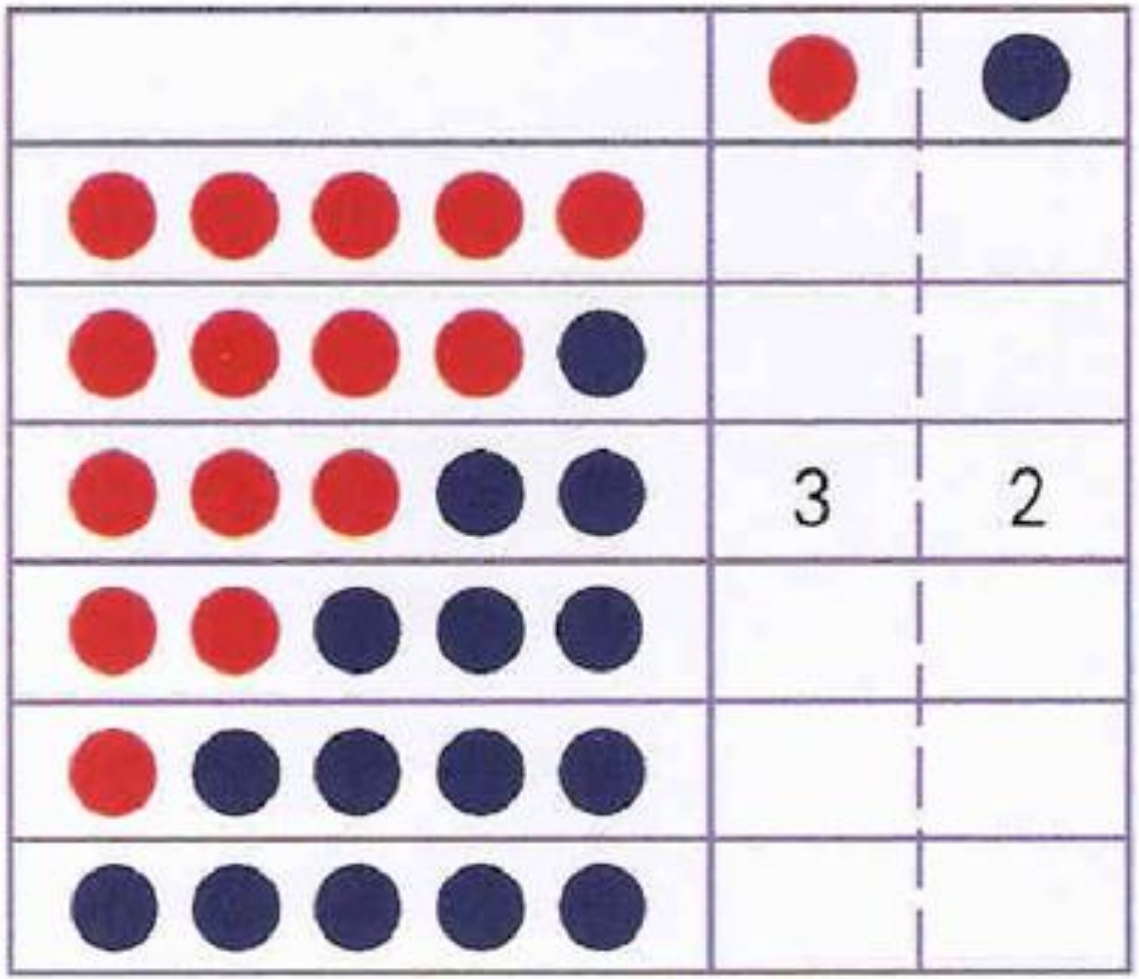
2 5

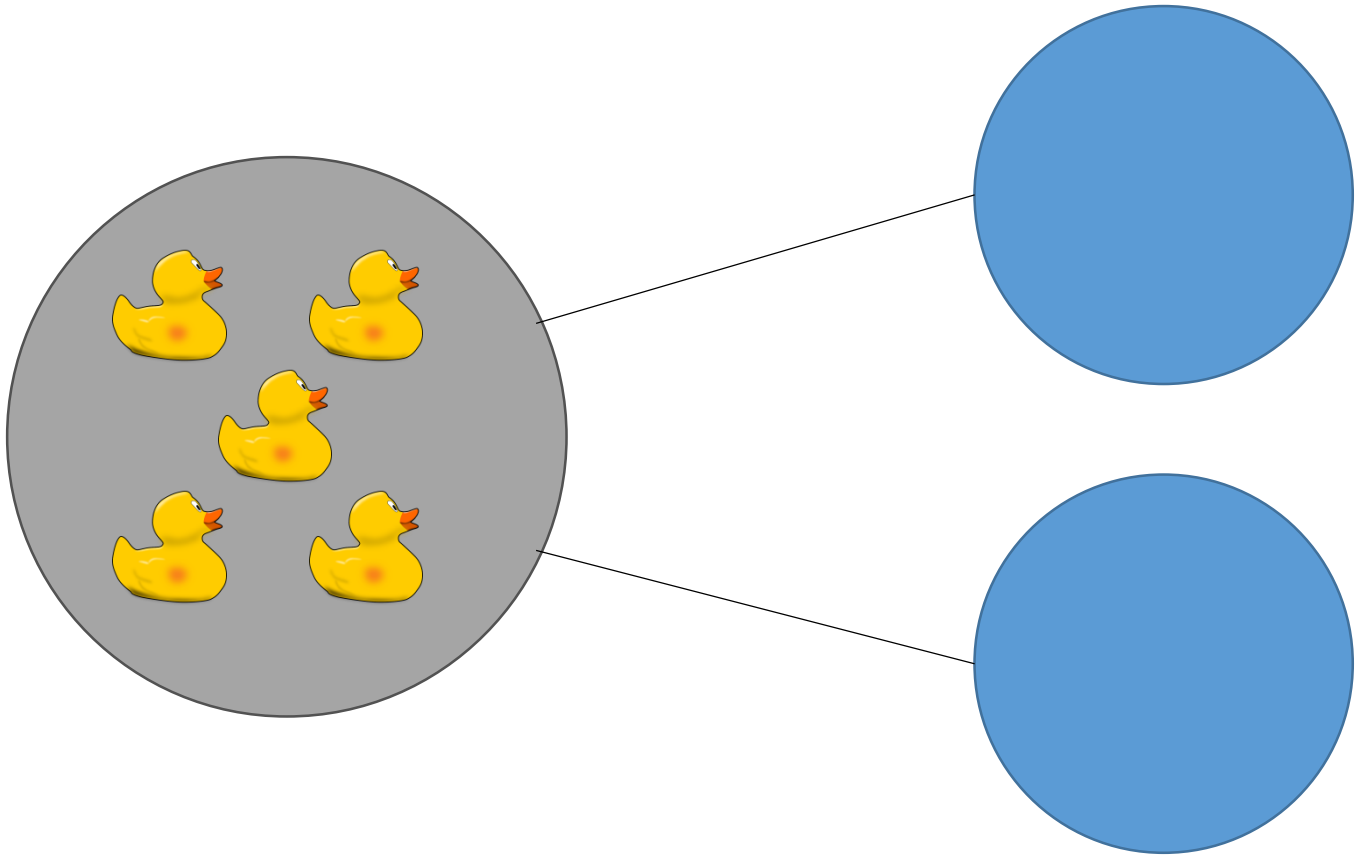
5 + 5 + 2

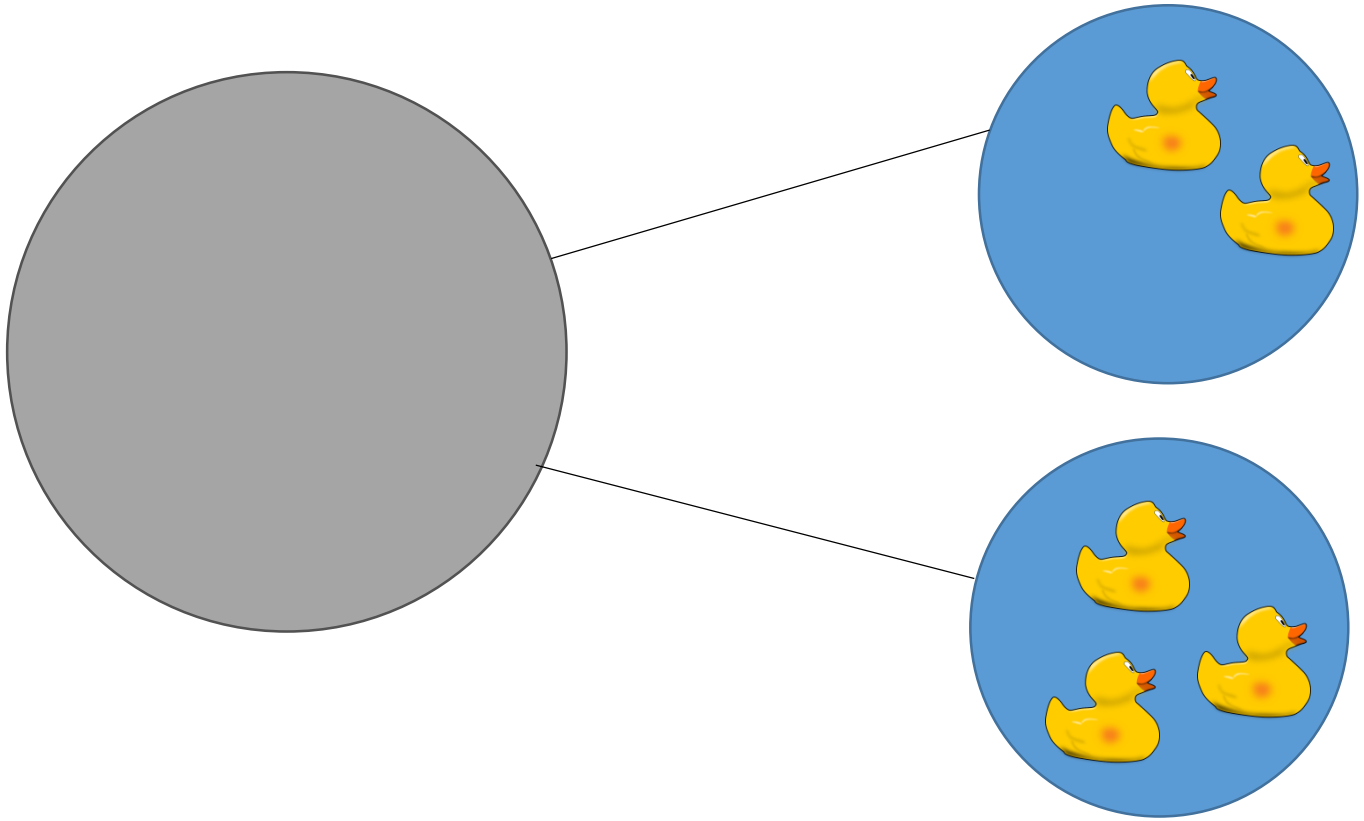


Part – Whole Relationships

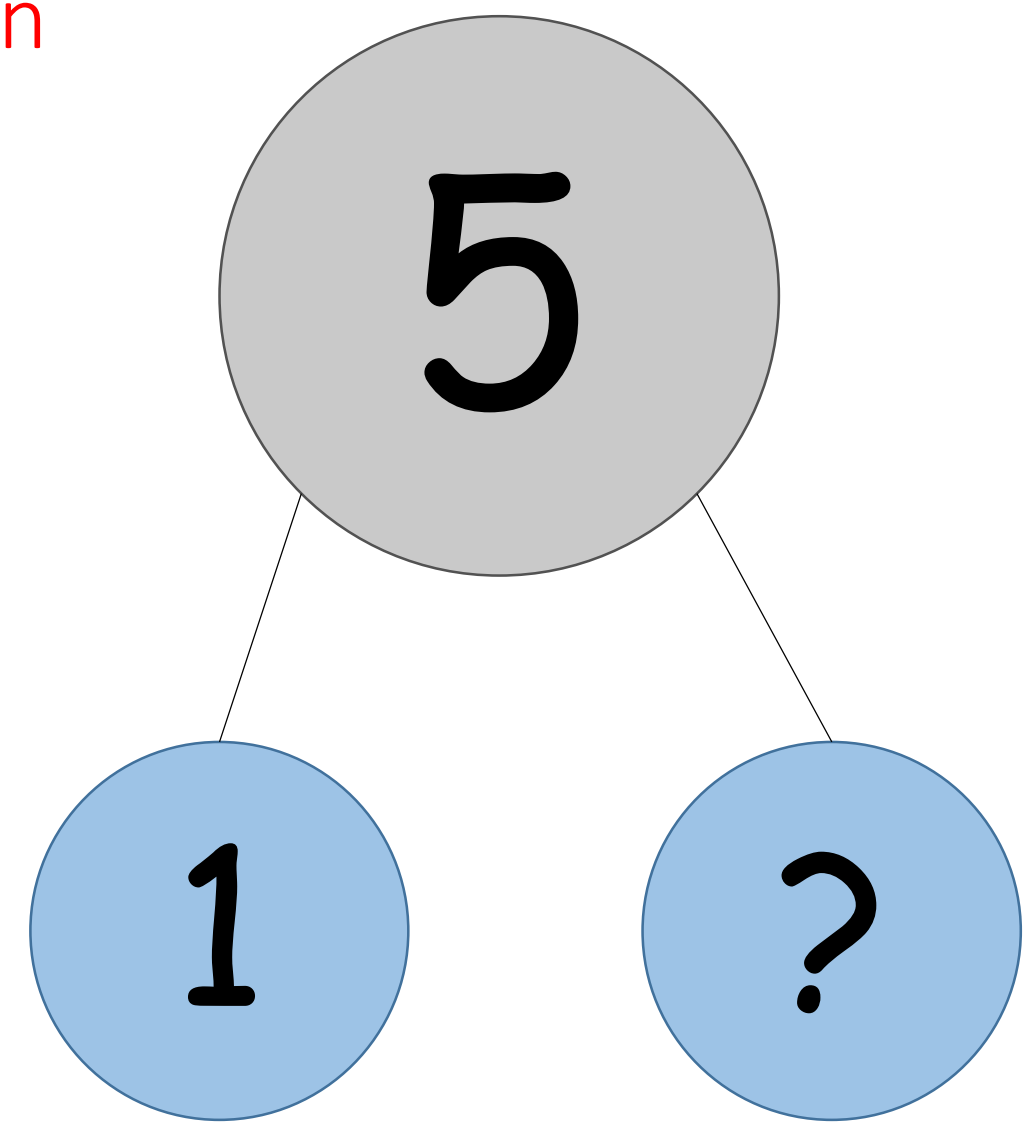




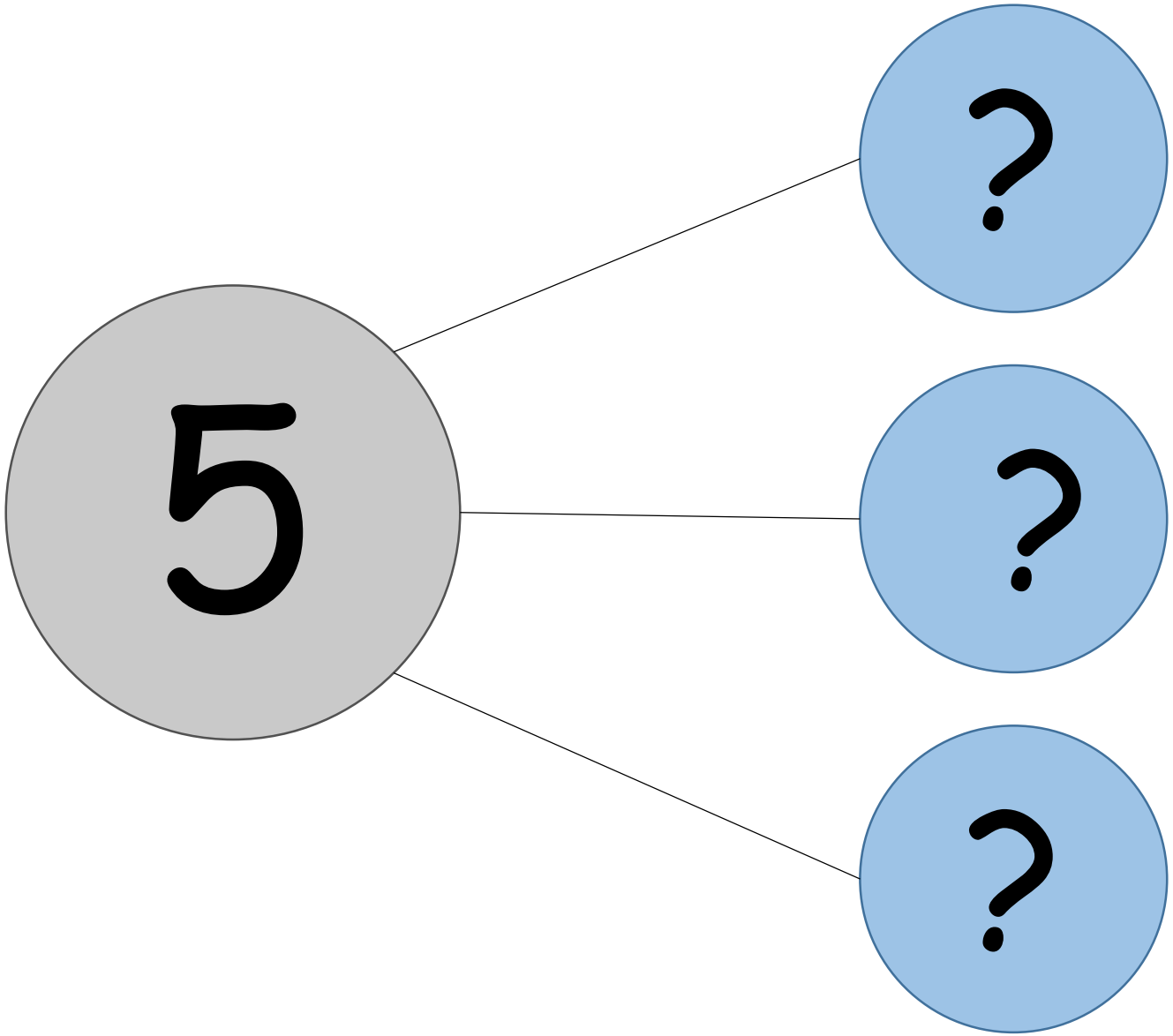




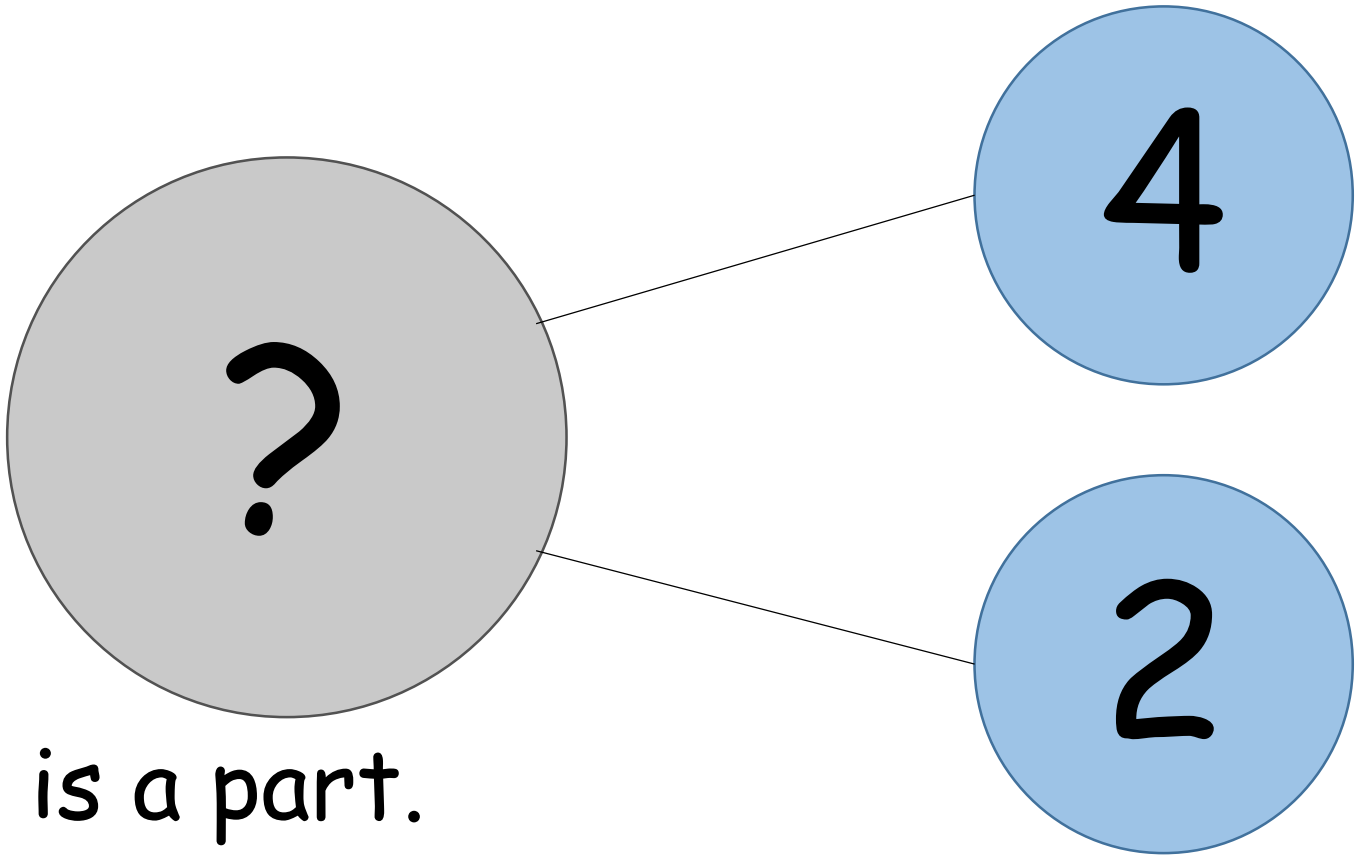
Variation



Variation



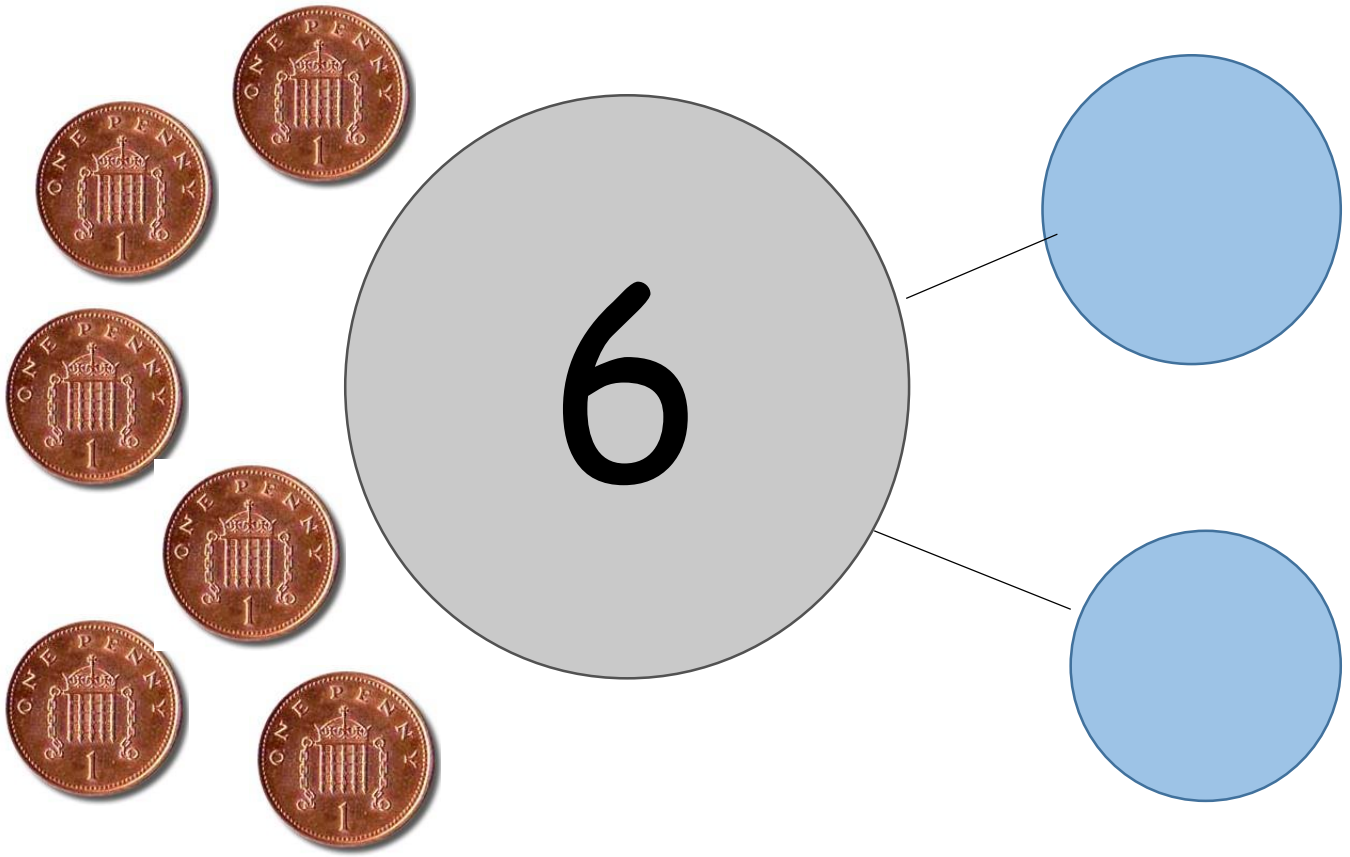
Variation

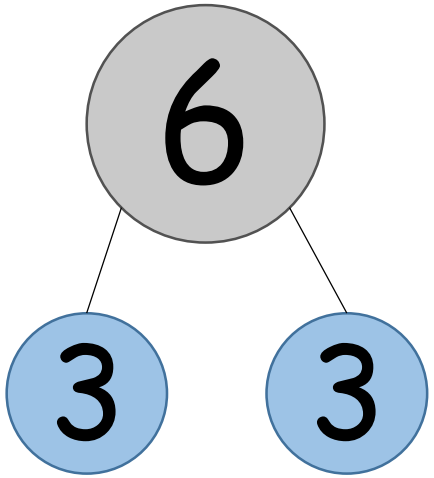


4 is a part.
2 is a part.
6 is the whole

Apply to other maths ‘stories’ / contexts

Dan’s trousers have two pockets and he has 6 pennies in his trouser pockets. How many coins might there be in each pocket?



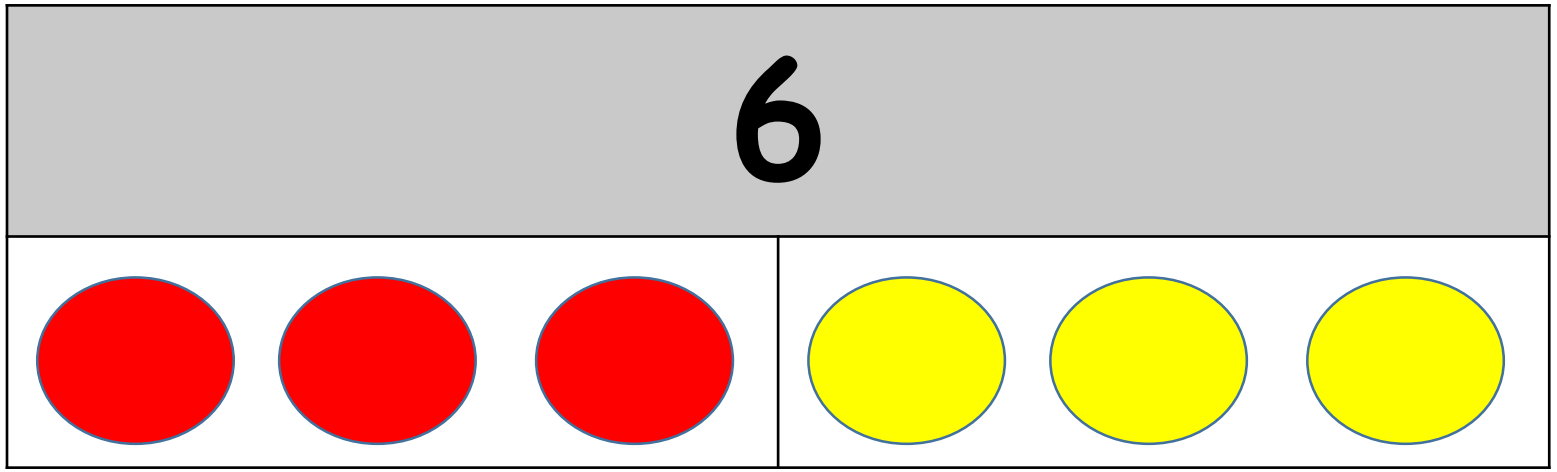


Use of stem sentences.

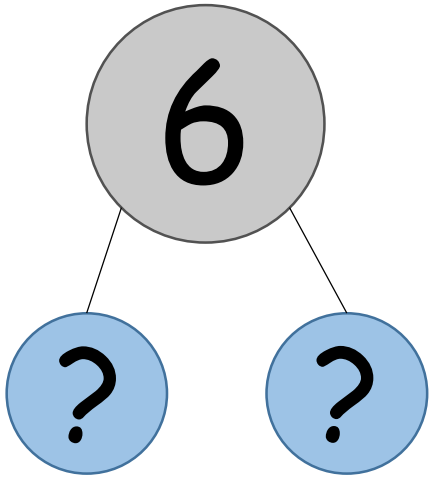
3 is a part.

3 is a part.

6 is the whole



Introducing the bar model

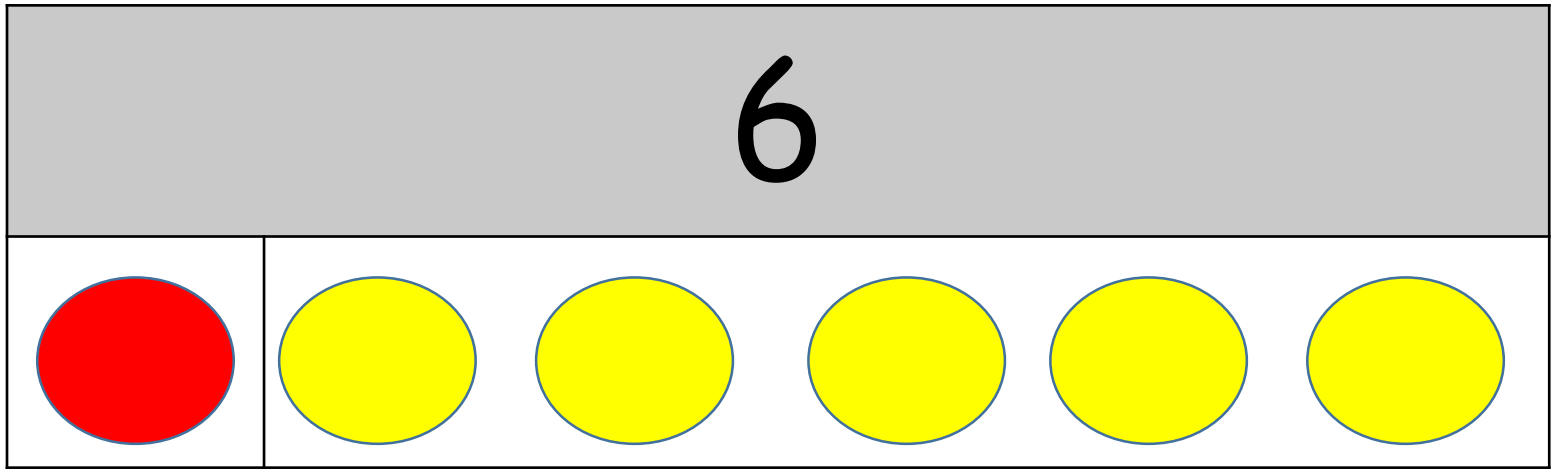


Use of stem sentences.

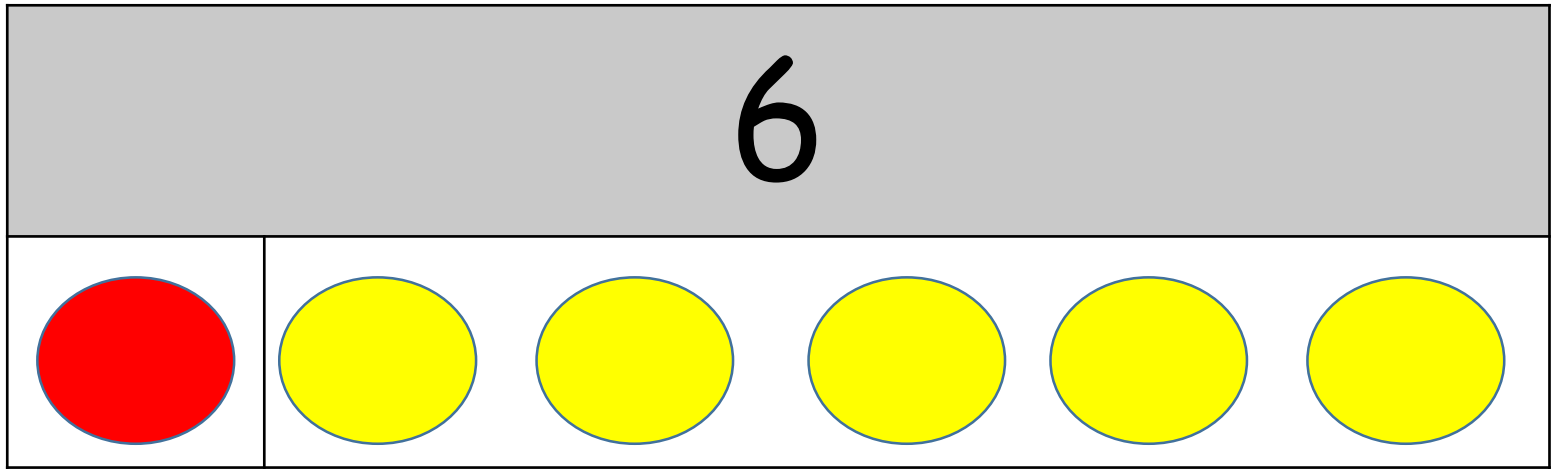
6 is the whole

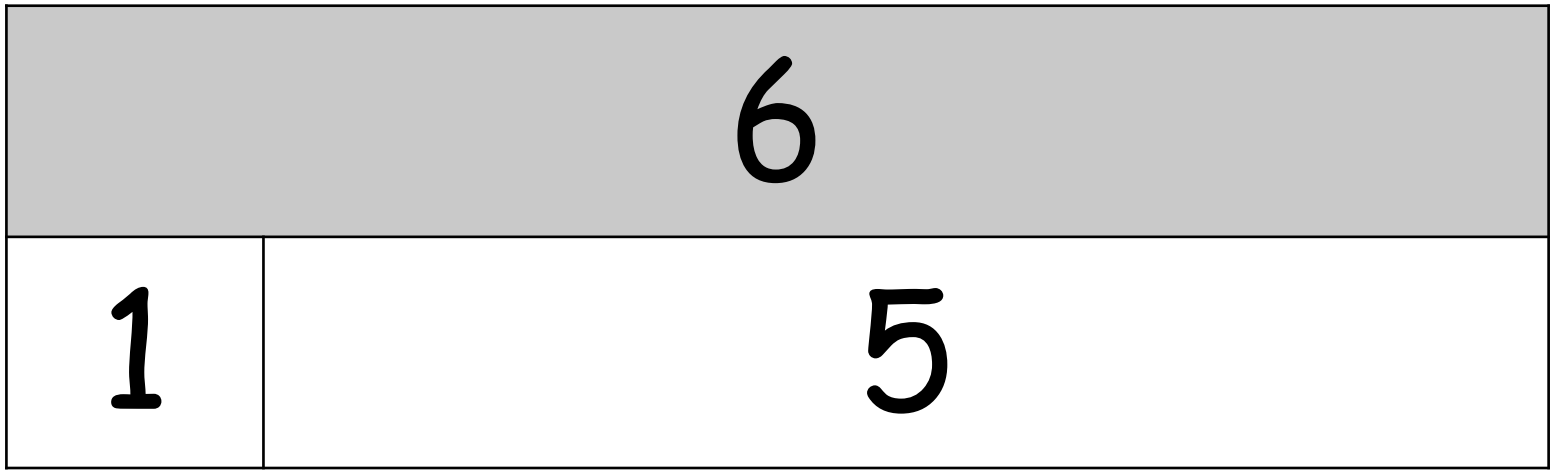
1 is a part.

5 is a part.

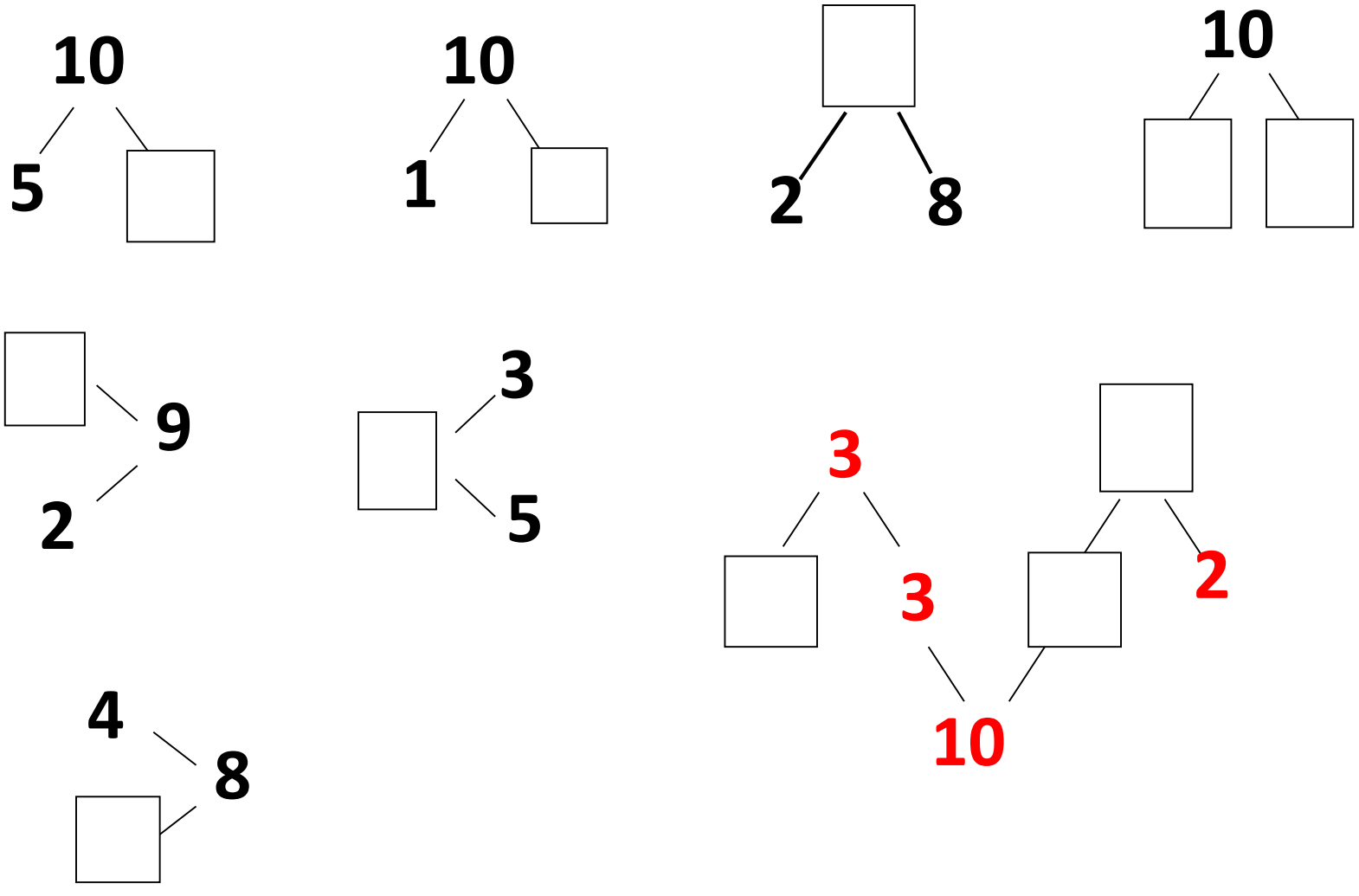


Move from pictorial/ symbolic to abstract.

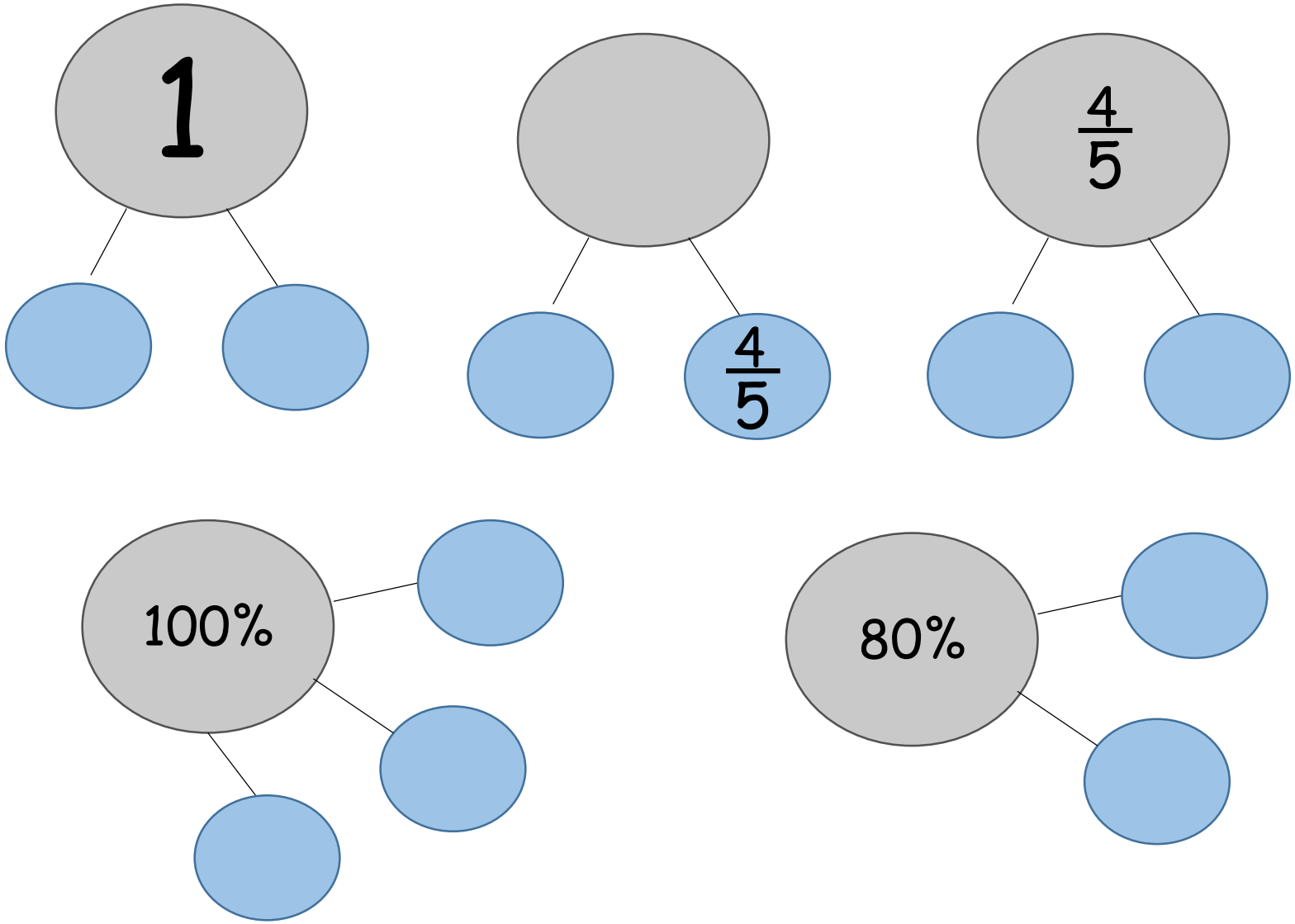




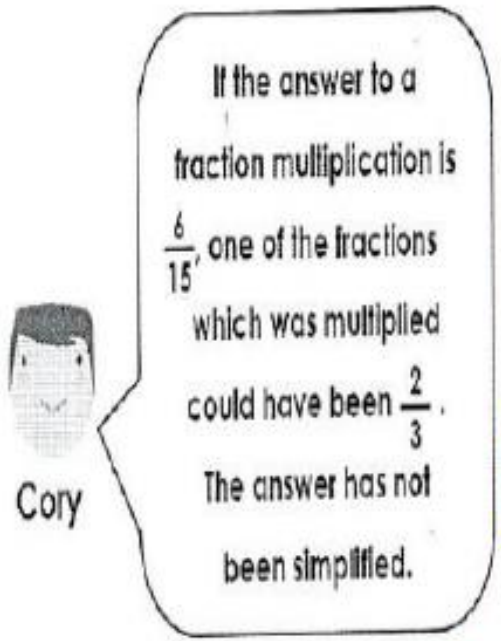
Mastery of the part whole model!



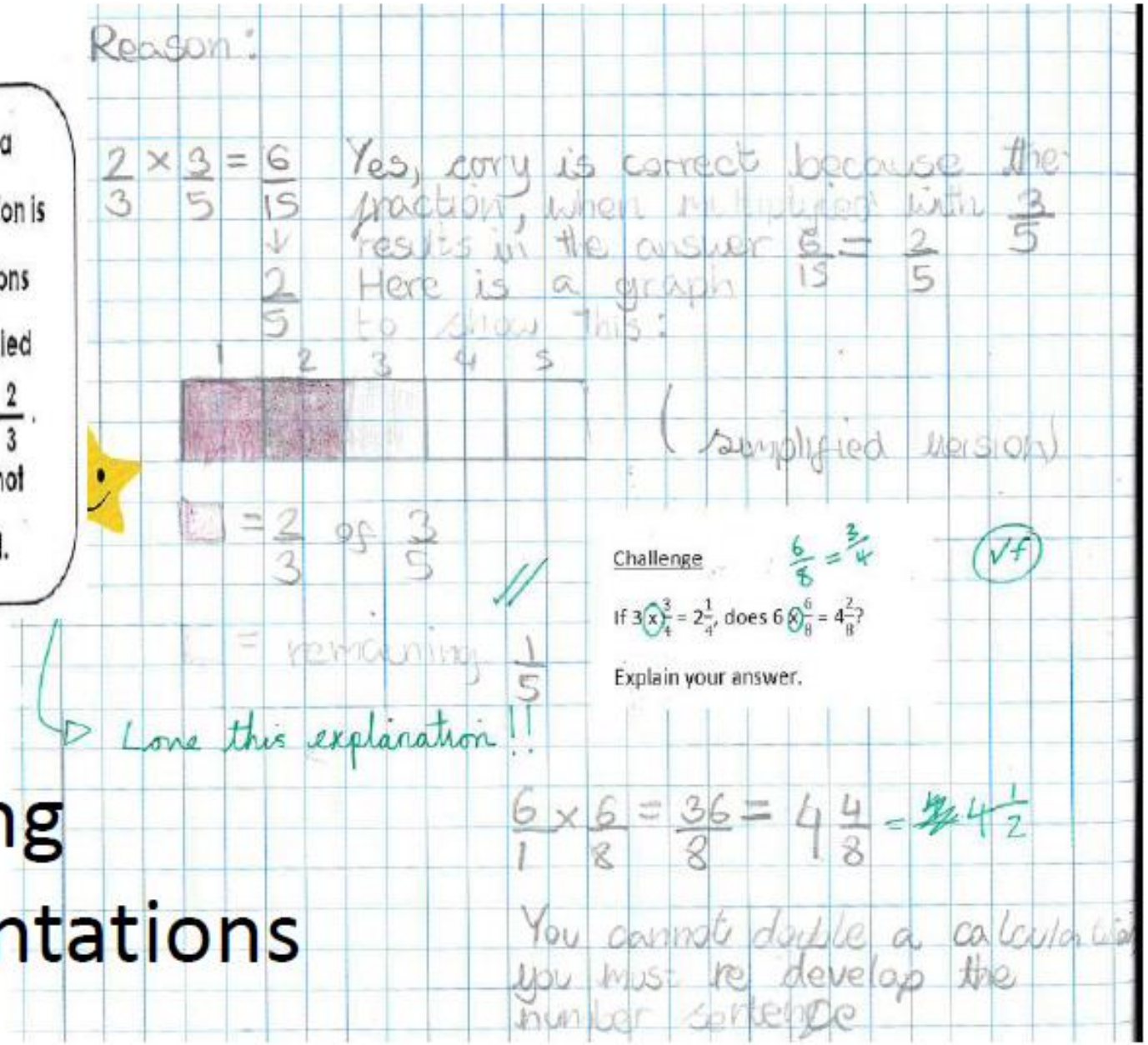
How might we use these models with older children?



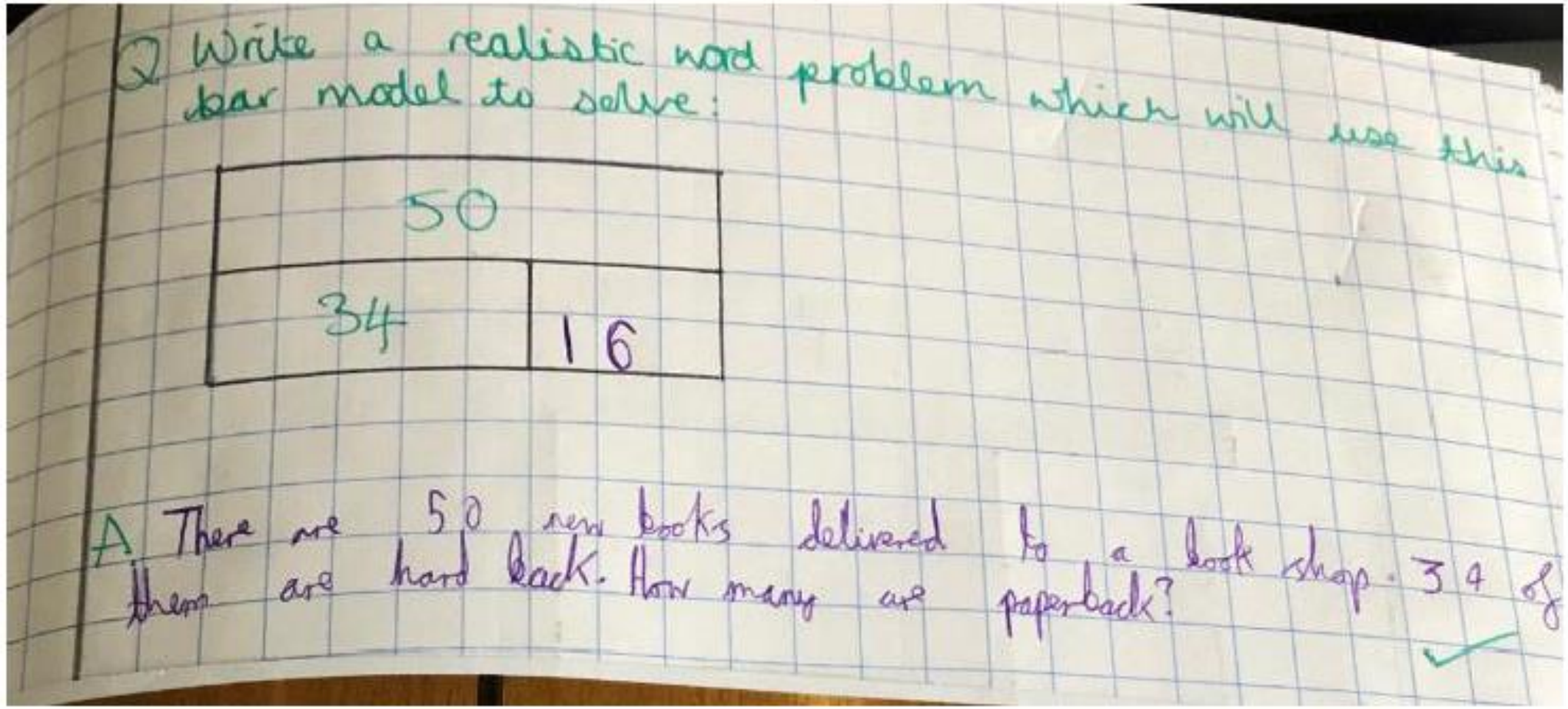
Reason



Proof
Explaining
Representations



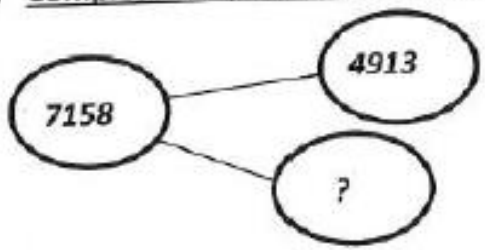
Maths Stories



A. **True or false?**

The difference between 8214 and 3192 is 5022.

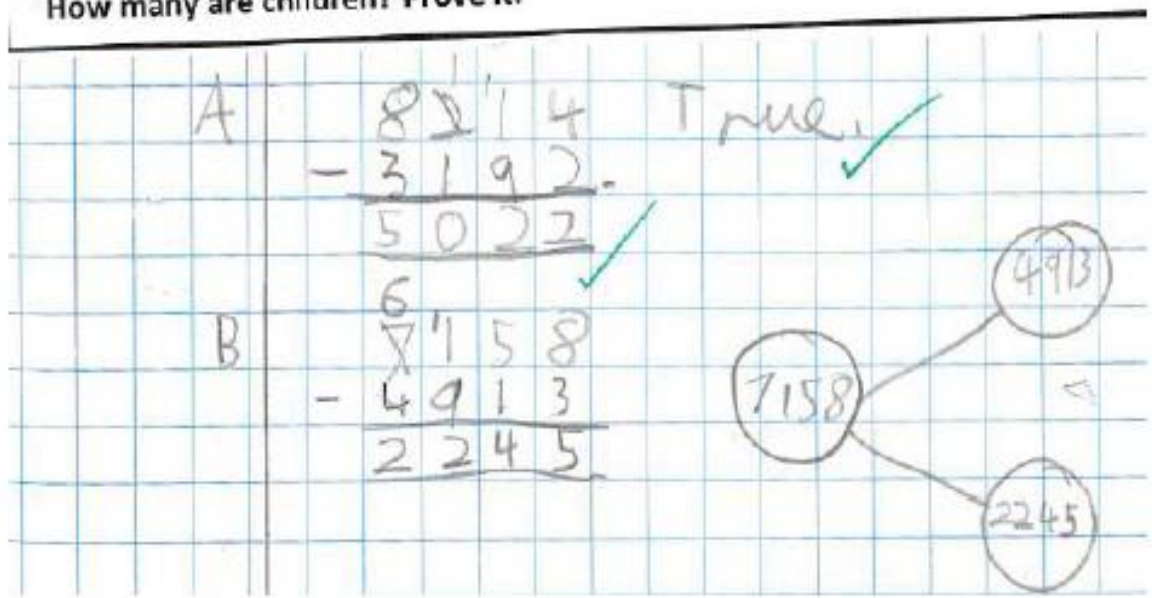
B. **Complete the part-whole model.**



C. **9,714 people are at the airport. 4,532 are men. 4,471 are women.**

9714		
4532	4471	?

How many are children? Prove it.



True or False

Different Representations

Supporting all learners

- Same input for all children
- Ping pong style teaching – all children get a chance to respond
- Group work and talk tasks
- Scaffolds – word bank, extra concrete resources, TA in small group
- Carefully planned questions to address misconceptions
- Carefully planned questions to challenge quick graspers

Supporting all learners

- Children work on the same independent questions which will be a mix of fluency, problem solving and reasoning.
- The tasks typically get more challenging as the children move through them.
- Children who are struggling may be in a small group to work on one or two tasks with a TA or teacher.
- Children who are comfortable with the learning will be able to choose a “Greater Depth” challenge which will challenge them further while still focusing on the same learning objective.

In maths lessons …

- Children are frequently asked to prove their answers.
- We never just tell the children to use a method without explaining why.
- Children are often led to come up with the method by themselves.
- Concrete and pictorial resources are used to help support their understanding.
- Teachers are always asking “Why?”, “How do you know?” and “Are you sure?!”

Maths at home

The School Run – Maths
https://www.theschoolrun.com/maths

Maths Bot – interactive resources and manipulatives
https://mathsbot.com/

TT Rockstars – times tables (all children have log ins)
https://ttrockstars.com/

Mathletics – all children have log ins
https://login.mathletics.com/

Questions