



Year 2 Calculation and Bar Modelling Policy

Additive Reasoning

ELO: To add and subtract

MI: Solve one-step problems with addition and subtraction:

- Using concrete objects and pictorial representations including those involving numbers, quantities and measures.
- Using the addition (+), subtraction (-) and equals (=) signs.
- Applying their increasing knowledge of mental and written methods.

MI: Represent and use number bonds and related subtraction facts to 20

MI: Add and subtract numbers using concrete objects and pictorial representations and mentally, including:

- One-digit and two-digit numbers to 20, including zero
- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers

MI: Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.

ELO: To use algebra

MI: Solve addition and subtraction problems involving missing numbers

Examples of adding:

Concrete experiences

Aggregation



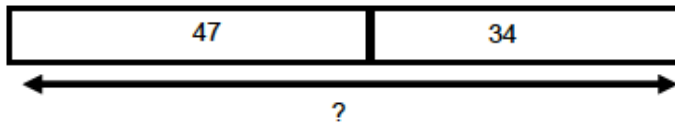
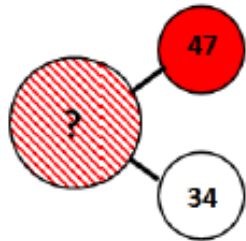
Numicon

Augmentation

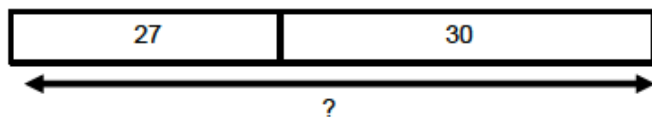
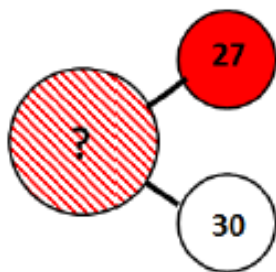


Multilink/ Cuisenaire/Bar model

Aggregation



Augmentation



Abstract/Written Method/Language

Aggregation (two quantities combined)

Sarah has 47p and Isabelle has 34p. How much do they have altogether?

$$\begin{aligned} 81 &= 34 + 47 \\ 47 + 34 &= 81 \\ 81 - 34 &= 47 \\ 81 - 47 &= 34 \\ 34 &= \square - 47 \end{aligned}$$

34 more than 47 is 81.
81 is 47 more than 34.
47 fewer than 81 is 34.
34 is 47 fewer than 81.

Augmentation (one quantity is increased)

Sarah has 27 gel pens. She buys 30 more. How many gel pens does she have now?

$$\begin{aligned} 57 &= 30 + 27 \\ 27 + 30 &= 57 \\ 57 - 30 &= 27 \\ 57 - 27 &= 30 \\ 30 &= \square - 27 \end{aligned}$$

30 more than 27 is 57.
57 is 27 more than 30.
27 more than 30 is 57.
30 fewer than 57 is 27.

Example of adding 3 single digit numbers

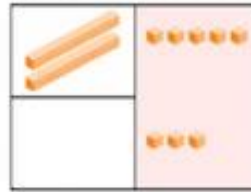
$7+3+2 =$ leads to $10 + 2 =$



Also give examples that are not in order e.g. $7+2+3 =$

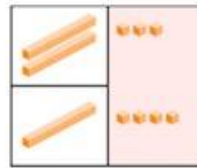
Examples of written methods for addition

Abstract/Written Method/Language



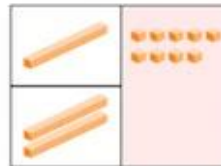
	tens	ones
	2	5
+		3
	2	8
	2	8

Step 1 Add the ones.
3 ones + 4 ones = 7 ones



	tens	ones
	2	3
+	1	4
	2	7
	2	7

Step 1 Add the ones.



	tens	ones
	1	9
+	2	0
	1	9
	1	9

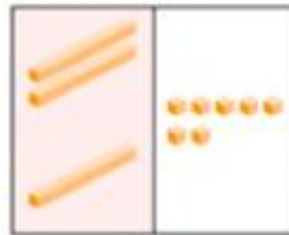
Step 2 Add the tens.
1 ten + 2 tens = 3 tens



	tens	ones
	1	9
+	2	0
	3	9
	3	9

$19 + 20 = 39$

Step 2 Add the tens.
 2 tens + 1 ten = 3 tens



$$23 + 14 = 37$$

	tens	ones
	2	3
+	1	4
	3	7

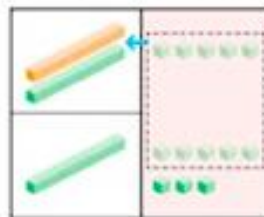
Adding with renaming

Add 15 and 18.

Use to help you add.

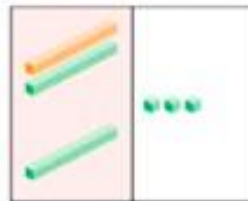


Step 1 Add the ones.
 5 ones + 8 ones = 13 ones
 Regroup the ones.
 13 ones = 1 ten and 3 ones



	tens	ones
	1	5
+	1	8
	1	3

Step 2 Add the tens.
 1 ten + 1 ten + 1 ten = 3 tens



$$15 + 18 = 33$$

	tens	ones
	1	5
+	1	8
	1	3
+	2	0
	3	3

Examples of subtracting (comparison- find the difference)

Concrete experiences

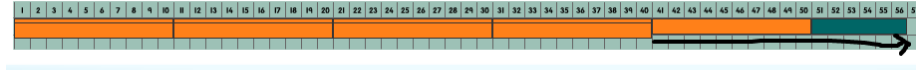
Isabelle



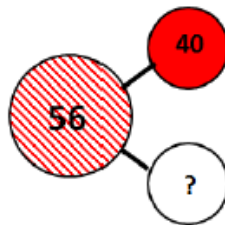
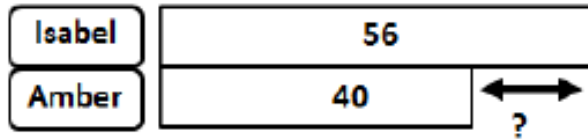
Amber



Numicon



Multilink/ Cuisenaire/Bar model

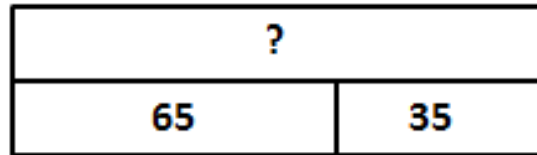
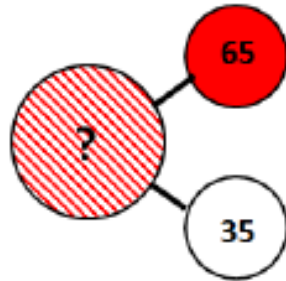


Abstract/Written Method/Language

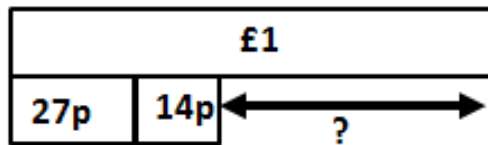
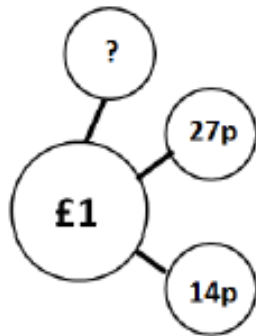
Amber has 40 buttons. Isabelle has 56 buttons. How many fewer buttons does Amber have than Isabelle?

Examples of other comparison models

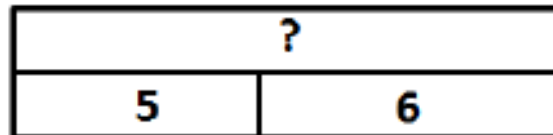
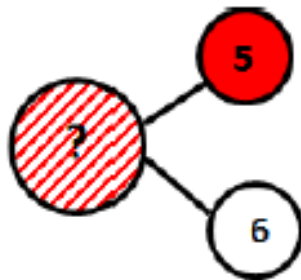
Tom has 65cm of ribbon. This is 35cm less than Sam has. How much ribbon does Sam have?



Ellie has £1 pocket money. She spent 27p on a pen and 14p on a rubber. How much money does she have left?



I think of a number then subtract 6. The answer is 5. What was my number?



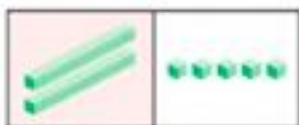
Examples of written methods for subtraction

Step 1 Subtract the ones.
8 ones - 3 ones = 5 ones



tens	ones
2	8
-	3
	5

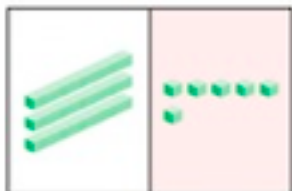
Step 2 Subtract the tens.



tens	ones
2	8
-	3
2	5

$28 - 3 = 25$

Step 1 Subtract the ones.



tens	ones
3	6
-	2
	6

Step 2 Subtract the tens.
3 tens - 2 tens = 1 ten




tens	ones
3	6
-	2
1	6

$36 - 20 = 16$

Subtract 24 from 37.

Step 1 Subtract the ones.
7 ones - 4 ones = 3 ones

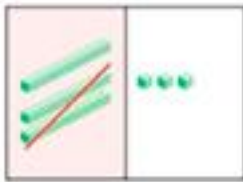


Use  to help you subtract.



tens	ones
3	7
- 2	4
	3

Step 2 Subtract the tens.
3 tens - 2 tens = 1 ten

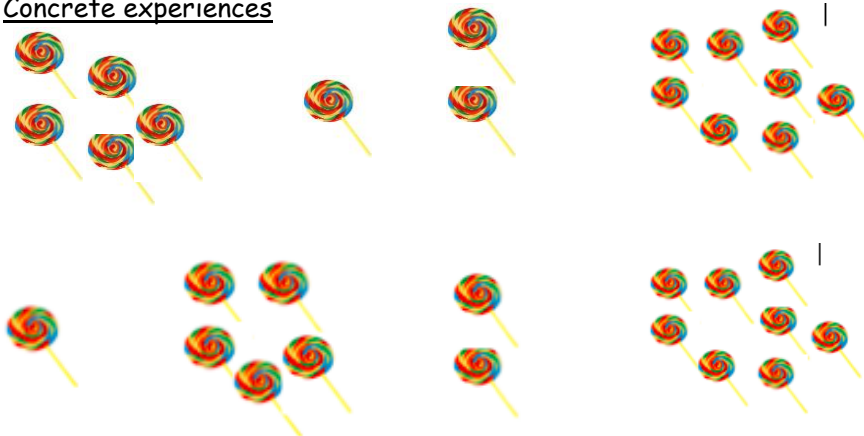


tens	ones
3	7
- 2	4
1	3

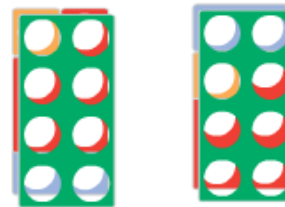
$$37 - 24 = 13$$

Exploring commutativity and associative law.

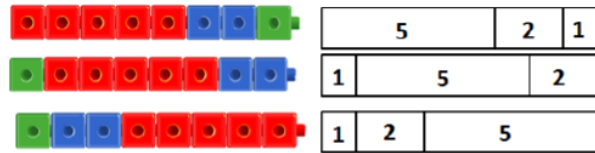
Concrete experiences



Numicon



Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

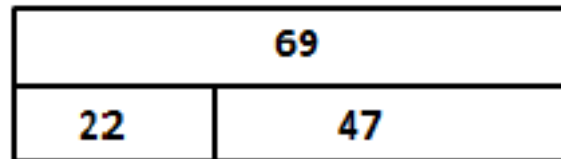
$$5 + 2 + 1$$

$$1 + 5 + 2$$

$$1 + 2 + 5$$

Examples of using the inverse to check calculations and find missing numbers.

Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

Sally writes an answer to the calculation below.

$$69 - 47 = 22$$

What calculations can she do to check her answer?

$$69 = 22 + 47$$

$$47 + 22 = 69$$

$$47 = 69 - 22$$

$$69 - 47 = 22$$

$$22 = 69 - \square$$

Multiplicative Reasoning

ELO: To know and use numbers

MI: Count in steps of 2, 5 and 10 from 0 or 1 and in tens from any number, forward and backward.

ELO: To multiply and divide

MI: Solve one-step (two-step at greater depth) problems involving multiplication and division.

MI: Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables.

MI: Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs.

Examples of multiplication using equal groups (It is important that children start to understand utilisation at this point)

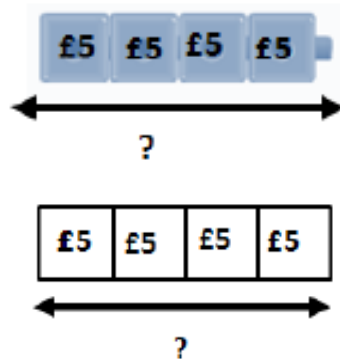
Concrete experiences



Numicon



Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

James buys four tickets for the football match. Each ticket cost 5 pounds. How much does he spend?

Four groups of £5 is £20.
£5 four times is £20.

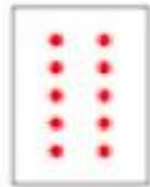
$$\begin{aligned} \pounds 5 + \pounds 5 + \pounds 5 + \pounds 5 &= \pounds 20 \\ 4 \times \pounds 5 &= \pounds 20 \end{aligned}$$

Examples of multiplication being commutative

How many dots are there?

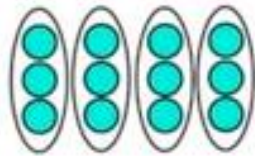


$$2 \times 5 = 10$$

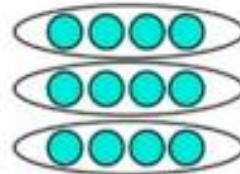


$$5 \times 2 = 10$$

2×5 is equal to 5×2 .



$$12 = 3 \times 4$$



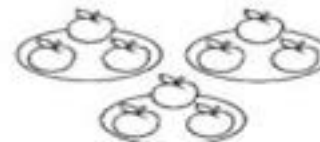
$$12 = 4 \times 3$$

Examples of using arrays and repeated addition in multiplication



$$3 \times 5 = \square$$

$$5 \times 3 = \square$$

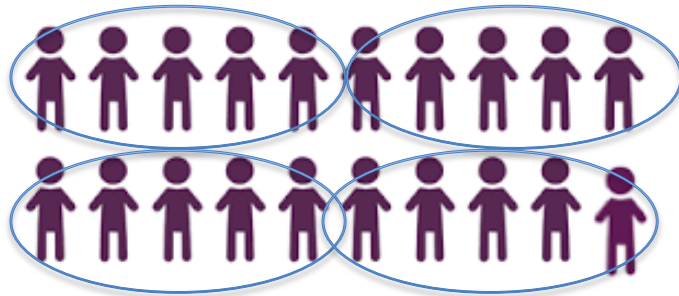


How many apples are there altogether?

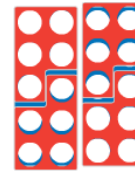
$$3 + 3 + 3 = 9$$

Examples of division using sharing

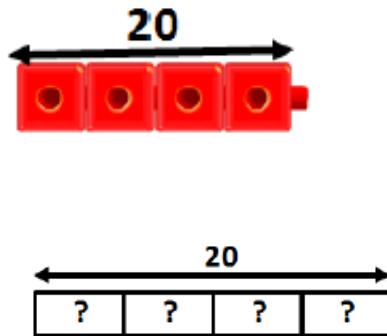
Concrete experiences



Numicon



Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

There are 20 children in the hall. The teacher wants to put the children into 4 equal teams. How many children are in each team?

20 shared equally between 4 groups results in 5 in each group.

$$20 \div 4 = 5$$

$$4 \times 5 = 20$$

Examples of division using grouping

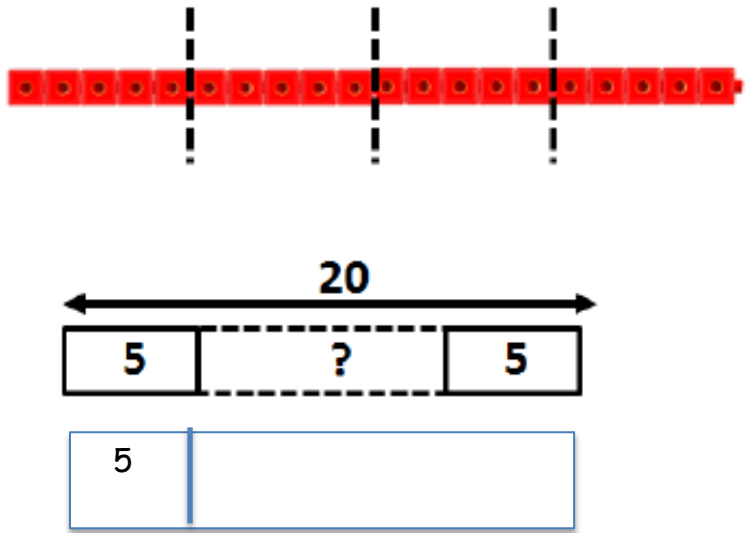
Concrete experiences



Numicon



Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

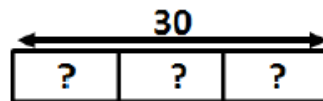
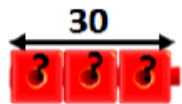
Grouping: Claire wants to put 5 biscuits on each plate. She has 20 biscuits. How many plates does she need?

There are 4 groups of 5 in 20.

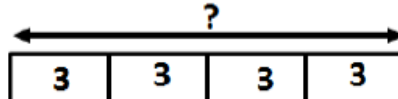
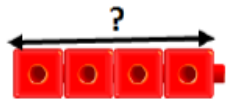
$$20 \div 5 = 4$$
$$4 \times 5 = 20$$

Additional examples

Amber has a ribbon 30cm long. She cuts it into 3 equal pieces. How long is each piece?



Claire has 4 building blocks. Each building block is 3m long. If she lays them end to end to build a wall, how long is the wall?



Fractions

ELO: To use fractions

MI: Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.

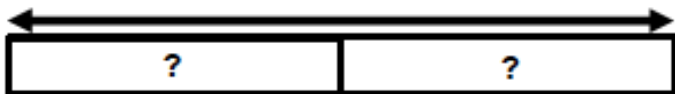
MI: Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

Half



What is half of 20?

20



What fractions do you see?

If the orange is worth 6, what is the value of the yellow?

If each of the yellow rods is worth 8, what is the value of the orange?

If the orange is worth 100, what is the value of the yellow?

Half of a number is 7, what is the number?

?



Repeat similar questions with the other fractions

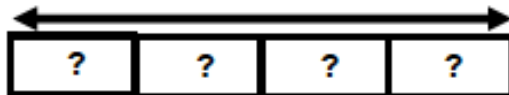
Quarters



What is one quarter of 16?

What is $\frac{3}{4}$ of 16?

16

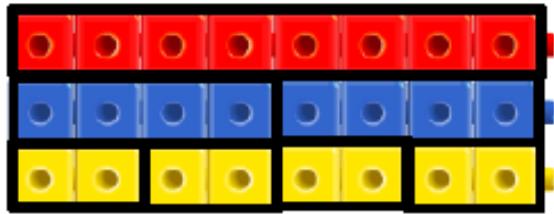


One quarter of a number is 5, what is the number?

?



Equivalence



Which other colour rods can you use to show both halves and quarters?

12			
6		6	
3	3	3	3