Year 3 Calculation and Bar Modelling Policy

Year 3

Additive Reasoning

ELO: To add and subtract

MI: Add and subtract numbers mentally, including:
- A three-digit number and ones.
- A three-digit number and tens.
- A three-digit number and hundreds.

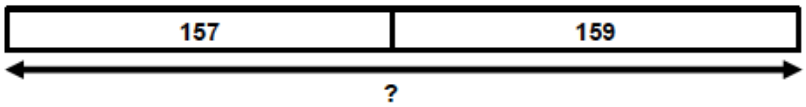
MI: Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

MI: Estimate and use inverse operations to check answers to a calculation.

MI: Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction.

Examples of adding:

Multilink/ Cuisenaire/Bar model



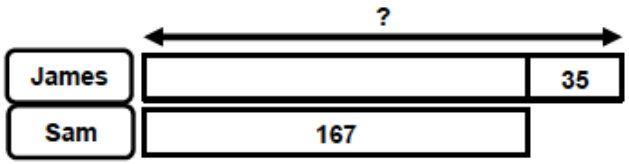
Abstract/Written Method/Language

In a cricket match, James' team score 157 runs in the first innings and 159 in the second innings. How many runs did they score in total?

157+159=

\+ 157
159

Multilink/ Cuisenaire/Bar model



Abstract/Written Method/Language

James scored 35 more points than Sam. Sam scored 167 points in his game. How many points did James score?

167+35=

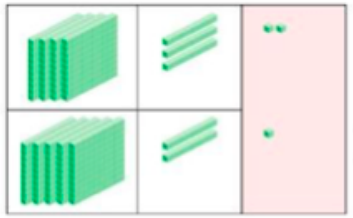
\+ 167
35

Examples of written methods for addition

Abstract/Written Method/Language

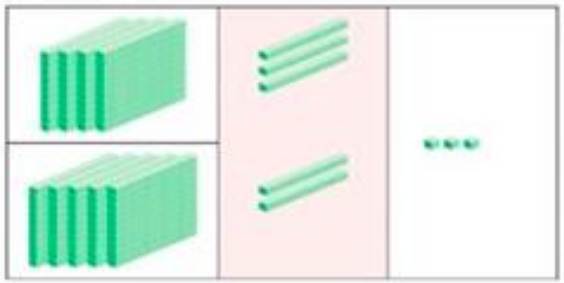
$432 + 521 =$

Step 1 Add the ones.
2 ones + 1 one = 3 ones



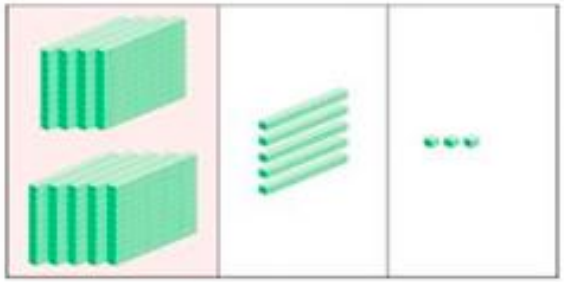
	h	t	o
	4	3	2
+	5	2	1
			3

Step 2 Add the tens.
3 tens + 2 tens = 5 tens



	h	t	o
	4	3	2
+	5	2	1
		5	3

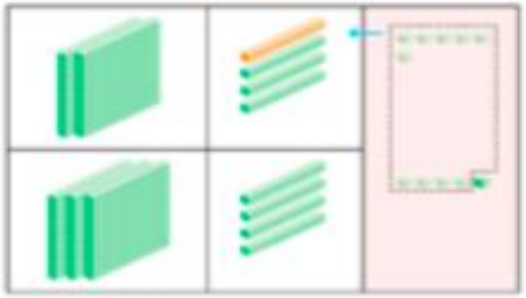
Step 3 Add the hundreds.
4 hundreds + 5 hundreds = 9 hundreds



	h	t	o
	4	3	2
+	5	2	1
	9	5	3

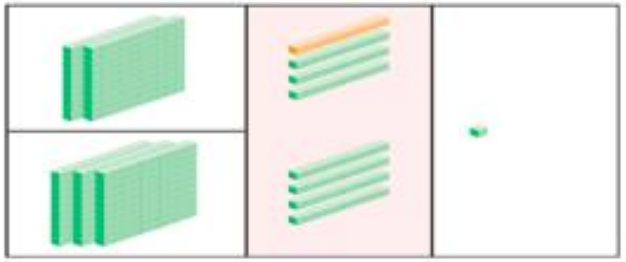
432 + 521 = 953

236 + 345 =



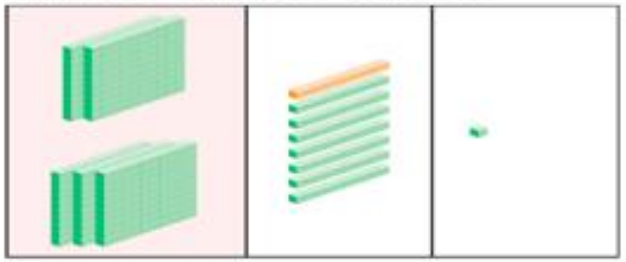
	h	t	o
		1	
	2	3	6
+	3	4	5
			1

Step 2 Add the tens.
1 ten + 3 tens + 4 tens = 8 tens



	h	t	o
		1	
	2	3	6
+	3	4	5
		8	1

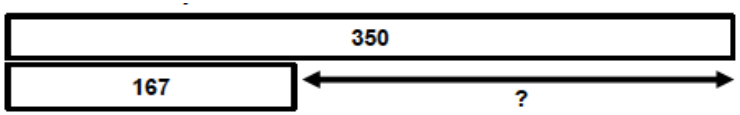
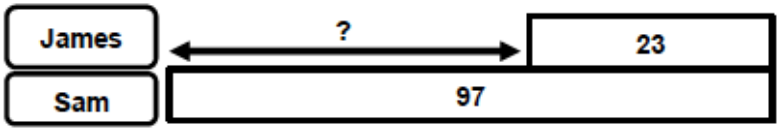
Step 3 Add the hundreds.
2 hundreds + 3 hundreds = 5 hundreds



	h	t	o
		1	
	2	3	6
+	3	4	5
	5	8	1

236 + 345 = 581

Examples of subtracting

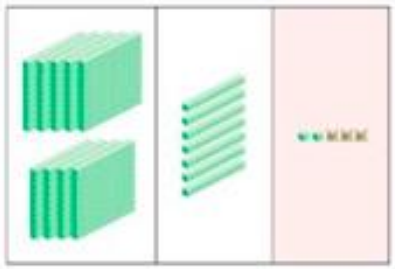
Multilink/ Cuisenaire/Bar model	Abstract/Written Method/Language
	There are 350 pages in Amber's book. On Tuesday, she reads 167 pages of her books. On Wednesday, she reads the rest of the book. How many pages did she read on Wednesday? 350-167 = - 350 167
Multilink/ Cuisenaire/Bar model	Abstract/Written Method/Language
	James has collected 23 fewer football stickers than Sam. Sam has collected 97. How many football stickers has James collected? 97-23 =

Year 3	**Example of written method for subtraction** Abstract/Written Method/Language

Only when secure with the method should exchanging be introduced.

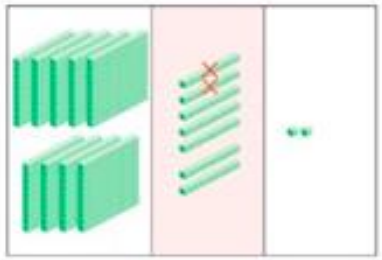
Subtract 723 from 975.

Step 1 Subtract the ones.
5 ones − 3 ones = 2 ones



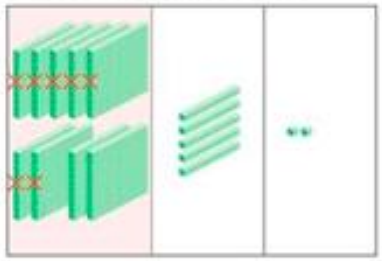
	h	t	o
	9	7	5
−	7	2	3
			2

Step 2 Subtract the tens.
7 tens − 2 tens = 5 tens



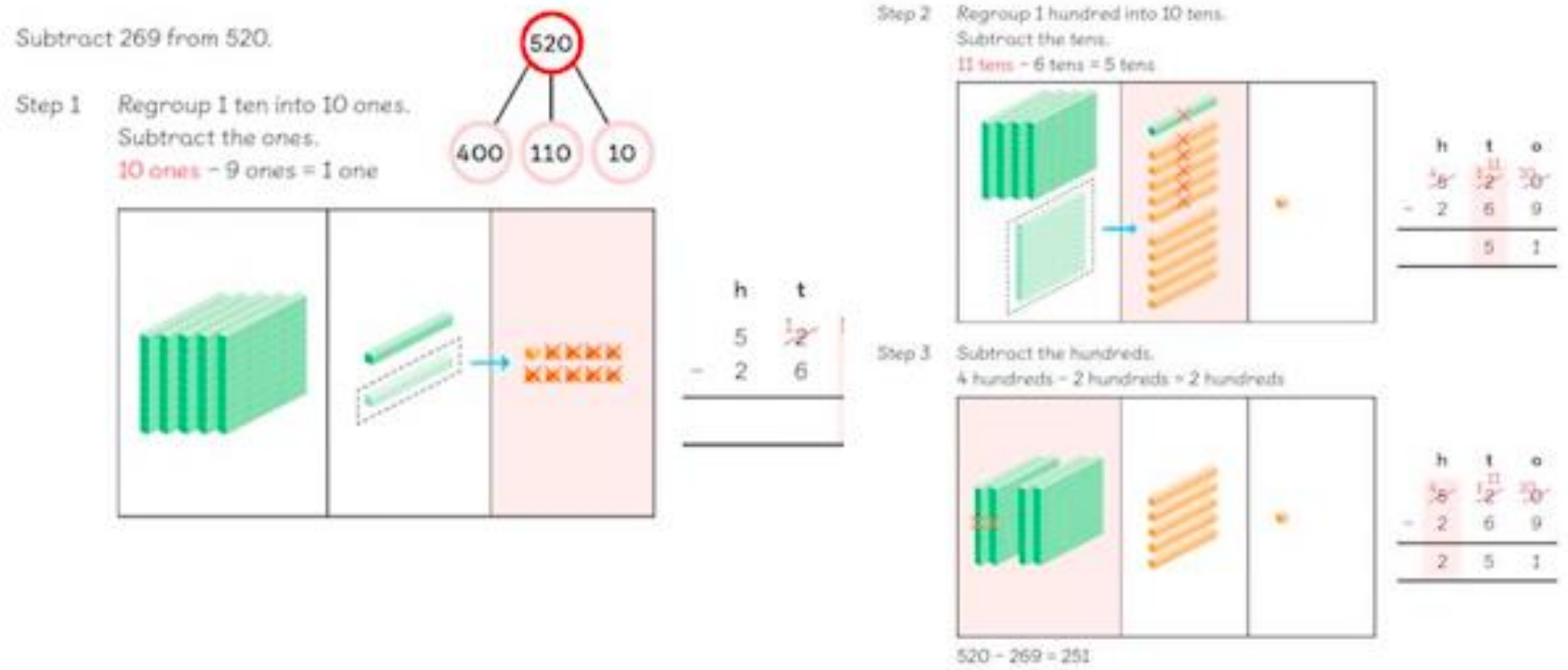
	h	t	o
	9	7	5
−	7	2	3
		5	2

Step 3 Subtract the hundreds.
9 hundreds − 7 hundreds = 2 hundreds



	h	t	o
	9	7	5
−	7	2	3
	2	5	2

975 − 723 = 252



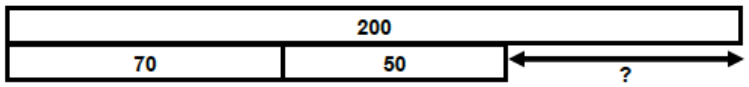
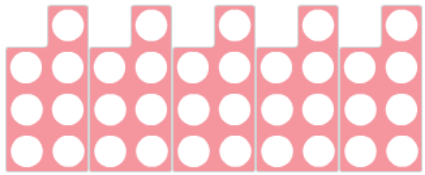
Examples of using the inverse to find the answer

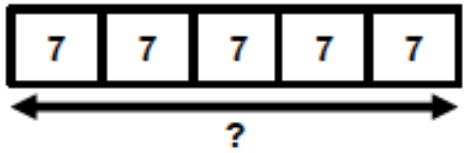
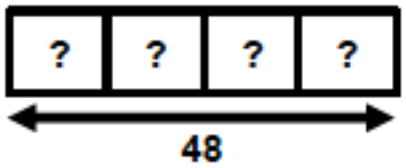
Multilink/ Cuisenaire/Bar model

351	
28	323

Abstract/Written Method/Language

For the calculation 323 + 28, Amber undertakes the calculation 351 -323. Can you explain why she chose to do this?

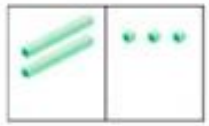
	Examples of solving multi-step problems	
	Multilink/ Cuisenaire/Bar model  	Abstract/Written Method/Language Sally has £2 pocket money. She spends 70p on a comic and 50p on a bar of chocolate. How much change should she get?
	Multiplicative Reasoning	
	ELO: To multiply and divide MI: Recall multiplication and division facts for multiplication tables up to 12 × 12. MI: Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.	
Year 3	**Examples of multiplication and division**	
	Concrete experiences 	Numicon 

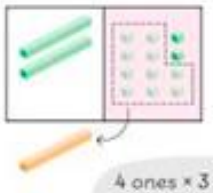
	<u>Multilink/ Cuisenaire/Bar model</u>   	<u>Abstract/Written Method/Language</u> 5 x 7 = ____ 4 x ___ = 48

Example of written method for multiplication

Let's Learn

1 There are 4 groups of 23 fish.
How do we multiply 23 by 4?





Step 1 Multiply the ones by 4.

4 ones × 3 = 12 ones
12 ones = 1 ten 2 ones

	t	o
	2	3
×		4
	1	2

Step 2 Multiply the tens by 4.

2 tens × 4 = 8 tens

	t	o
	2	3
×		4
	1	2
	8	0

Step 3 Add the products.

12 + 80 = 92

	t	o
	2	3
×		4
	1	2
+	8	0
	9	2

23 × 4 = 92

There are 92 fish in 4 tanks.

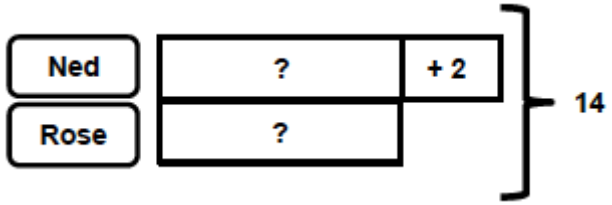
Examples of solving problems, including missing number problems, involving multiplication and division

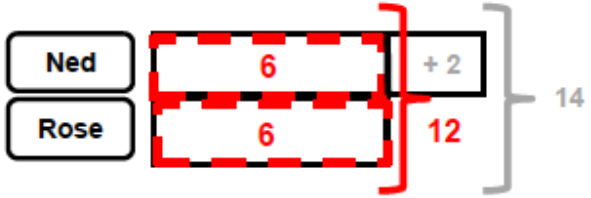
ELO: To multiply and divide

MI: Recall multiplication and division facts for multiplication tables up to 12 × 12.

MI: Recognise and use the inverse relationship between multiplication and division and use this to check calculations and solve missing number problems.

Multilink/ Cuisenaire/Bar model



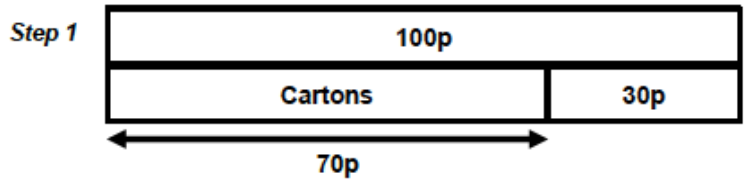


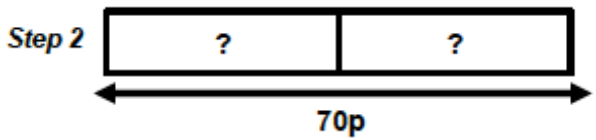
Abstract/Written Method/Language

Ned and Rose have some biscuits. Altogether, they have 14 biscuits. Ned has 2 more biscuits than Rose. How many biscuits do they each have?

Year 3

Multilink/ Cuisenaire/Bar model



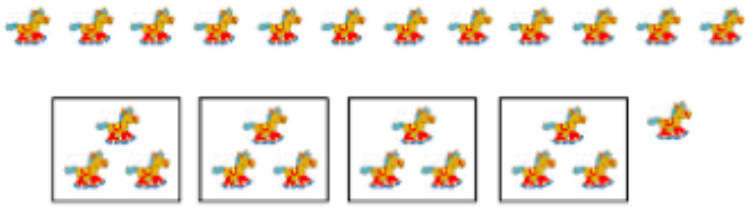


Abstract/Written Method/Language

I had one pound. I bought two cartons of drink and received 30p change. How much did each carton cost?

Examples of division with remainders

Concrete experiences



Numicon

Multilink/ Cuisenaire/Bar model

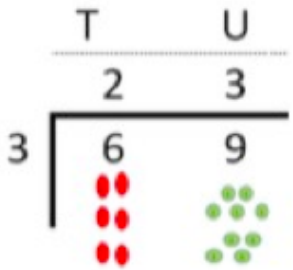
Abstract/Written Method/Language

13 ÷ 4 = 3 Remainder 1

Example of written method for division

Guidance Notes: Dividing using short division.

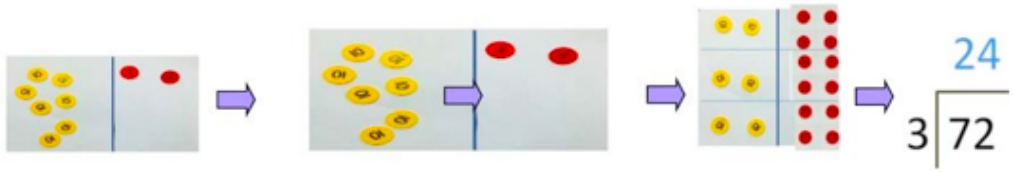
*Once children are secure with division as grouping and demonstrate this using number lines, arrays etc., **short division** for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array.*



Remind children of correct place value, that 69 is equal to 60 and 9, but in short division, pose:

· *How many 3's in 6? = 2, and record it above the **6 tens**.*
· *How many 3's in 9? = 3, and record it above the **9 ones**.*

Once children demonstrate a full understanding of remainders, and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. 72÷3), and be taught to 'carry' the remainder onto the next digit.



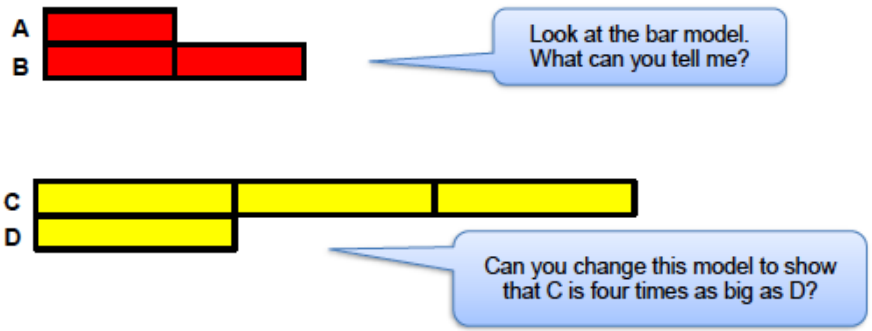
Examples of scaling problems and correspondence problems

ELO: To multiply and divide

MI: Solve problems involving multiplying and dividing, including using the distributive law to multiply two-digit numbers by one-digit, integer scaling problems and harder correspondence problems (such as n objects are connected to m objects).

Year 3

Multilink/ Cuisenaire/Bar model

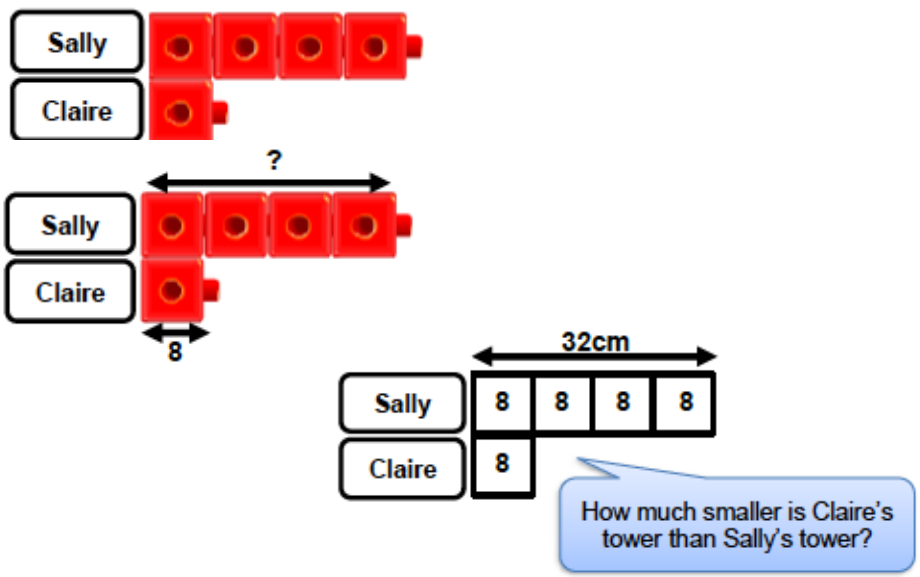
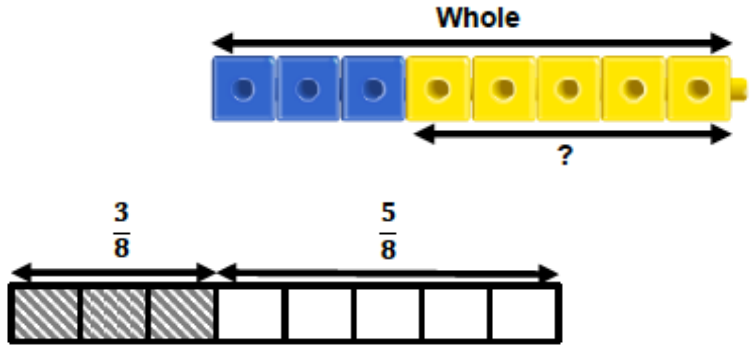


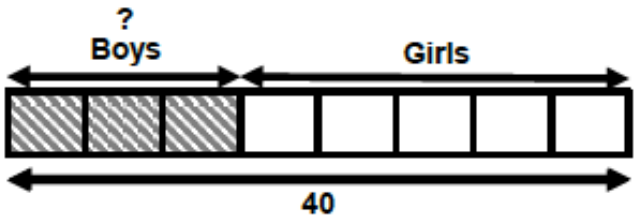
Abstract/Written Method/Language

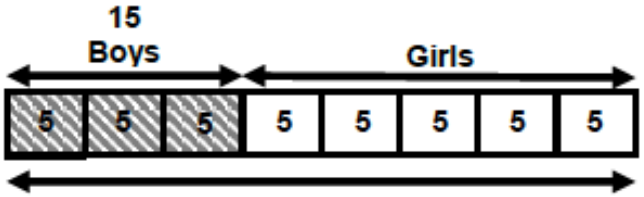
Look at the bar model. What can you tell me?

Provide a speaking frame if required, for example:

.... is twice as many as ...
... is three times as many as ...

	Multilink/ Cuisenaire/Bar model  	Abstract/Written Method/Language Claire builds a tower that is 8 cubes tall. Sally builds a tower that is 4 times as tall. How tall is Sally's tower? How much smaller is Claire's tower?
	Fractions ELO: To use fractions MI: Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.	
	Multilink/ Cuisenaire/Bar model  	Abstract/Written Method/Language $\frac{3}{8}$ of a class are boys. What fraction of the class are girls?





If there are 40 children in the class, how many boys are there?

Equivalence

ELO: To use fractions

MI: Recognise and show, using diagrams, families of common equivalent fractions.

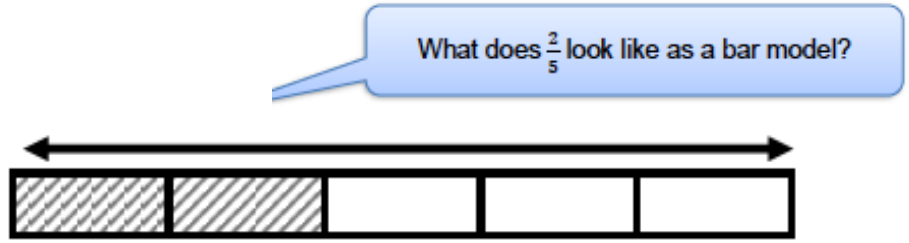
Guidance Notes:

Children could explore this with Cuisenaire rods first and then with bar models.

Year 3

Multilink/ Cuisenaire

Bar Model



Find equivalent fractions to $\frac{2}{5}$

Always ensure the children reference 'the whole'