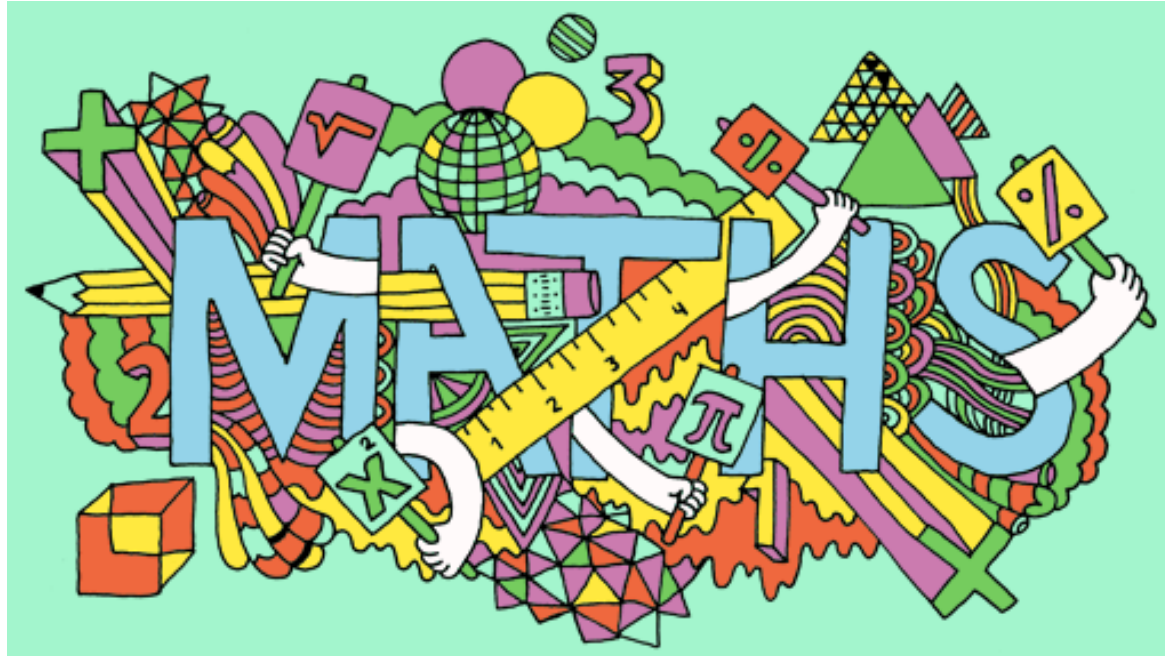# Marvellous Maths

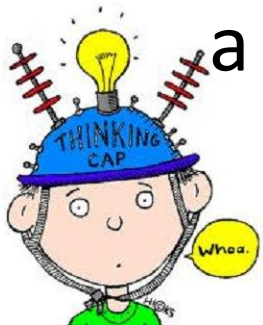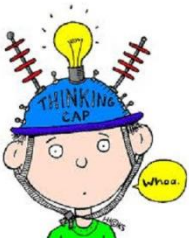## Parent Workshop: June 2022

Bar Modelling
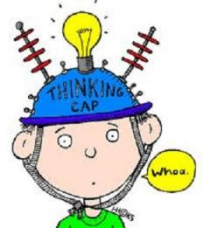
Year 5

Aims of this morning:

- To share information about how we use bar modelling to help children to solve word problems

- To look at examples of how we introduce bar modelling and develop its use through KS2

- To have a go at using the bar model to solve a few problems!

The Bar Model...

- A representation, which reveals the structure of a word problem

- Is a way of acting out a problem

- Helps children to visualise and make sense of a problem

- Can be used to solve problems involving whole numbers, fractions, ratio and percentages
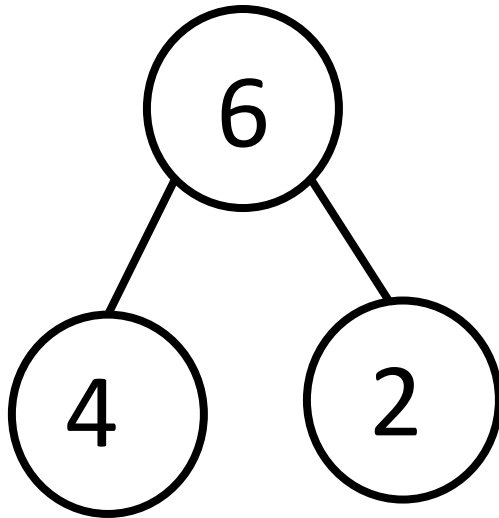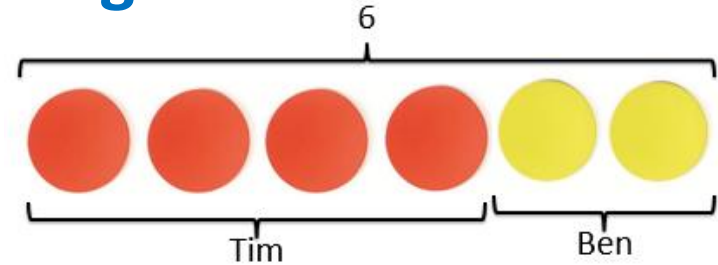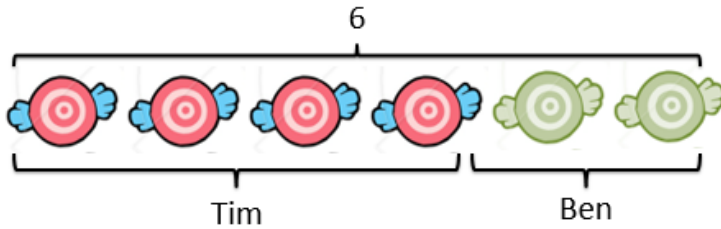
- Is <u>not</u> a calculating tool

Tim has 4 sweets. Ben has 2 sweets.

How many sweets do they have altogether?

Can you represent this story with paper strips or Cuisenaire?

Progression in bar modelling
Small steps through CPA

6

Tim   Ben

6

Tim   Ben

6	
4	2

6

4   2

4 + 2 = 6

Addend + addend = sum

Part whole structure - subtraction

There are 6 flowers. 4 of these are red and the rest are yellow.

How many flowers are yellow?

Can you model this using equipment, paper and/ or bar models?

Change structure - addition

Tim has 4 sweets. Ben gives him 2 more. How many sweets does Tim have now?

Change structure - subtraction

Represent this problem with paper or Cuisenaire and then draw a bar model for it.

Sam has a 35cm piece of ribbon. He uses 20cm to wrap a present. How much ribbon is left?

What does each bar on your model represent?

Part whole and change (before/ after) structures

- Jill was building a tower. At the beginning of the morning, it was 5 lego bricks tall. When she finished the tower, it was 20 bricks tall. How many bricks did she add over the morning?

- After paying for his groceries in cash, Mr Martin still has £56 in his wallet. His groceries cost £72. How much cash did he have before paying for his shopping?

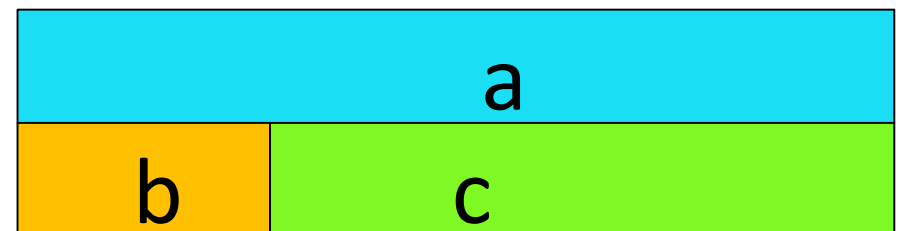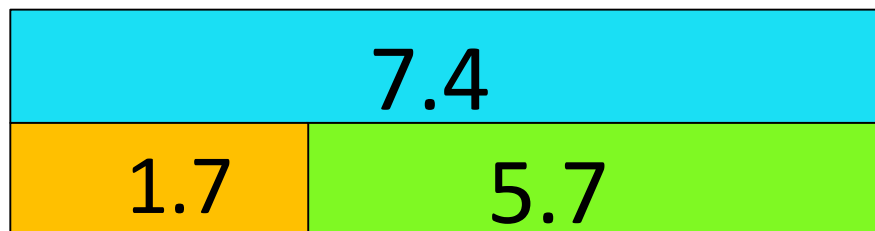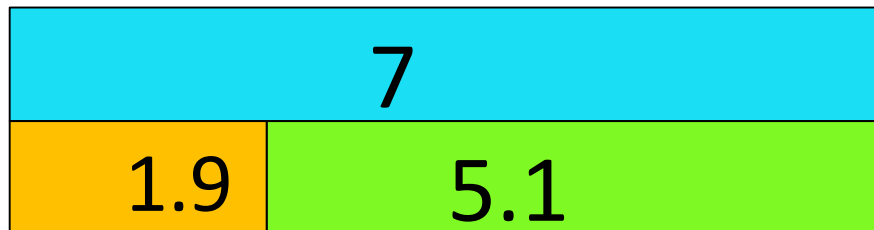# How might we generalise these models and use them with older children?
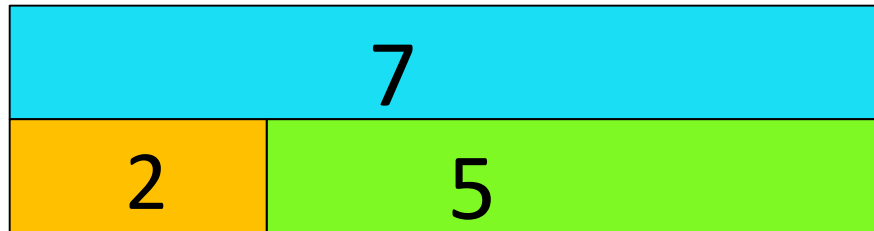
7 − 2 = 5
7 − 5 = 2
2 + 5 = 7
5 + 2 = 7

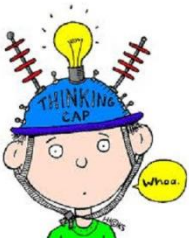If we understand the structure of the bar model, we can generalise and use it with any numbers.
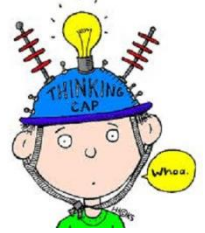
$a − b = c$
$a − c = b$
$b + c = a$
$c + b = a$

Comparison structure

Max has 5 more pencils than Martha.

Represent this story with paper or Cuisenaire.

- Which is Max's model?

- Which is Martha's model?

What other language could we use to compare the amount of pencils that Max and Martha have?
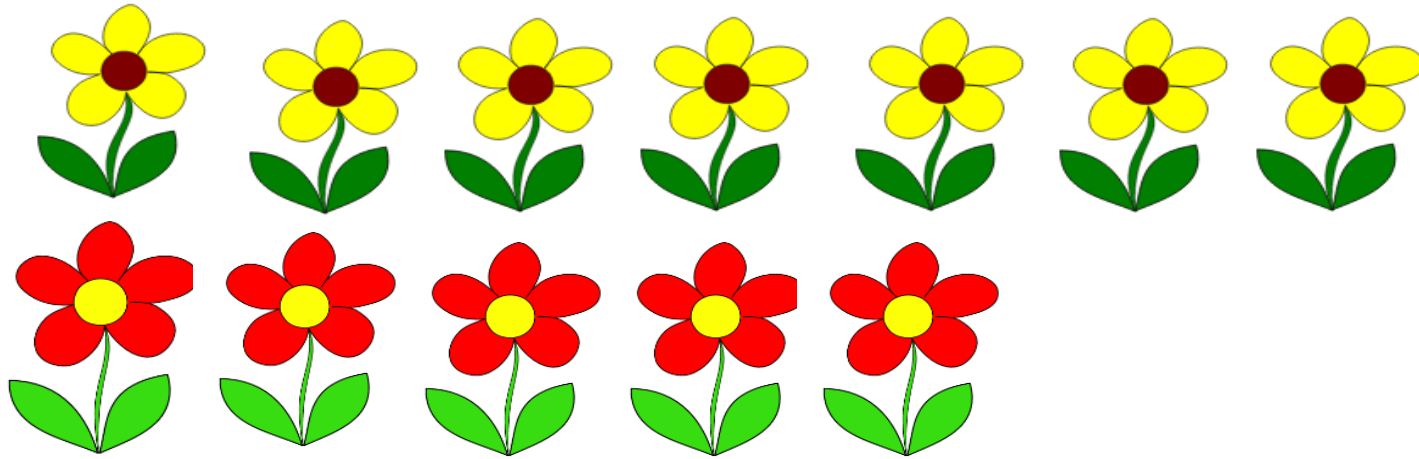
Comparison concept
Modelling the difference

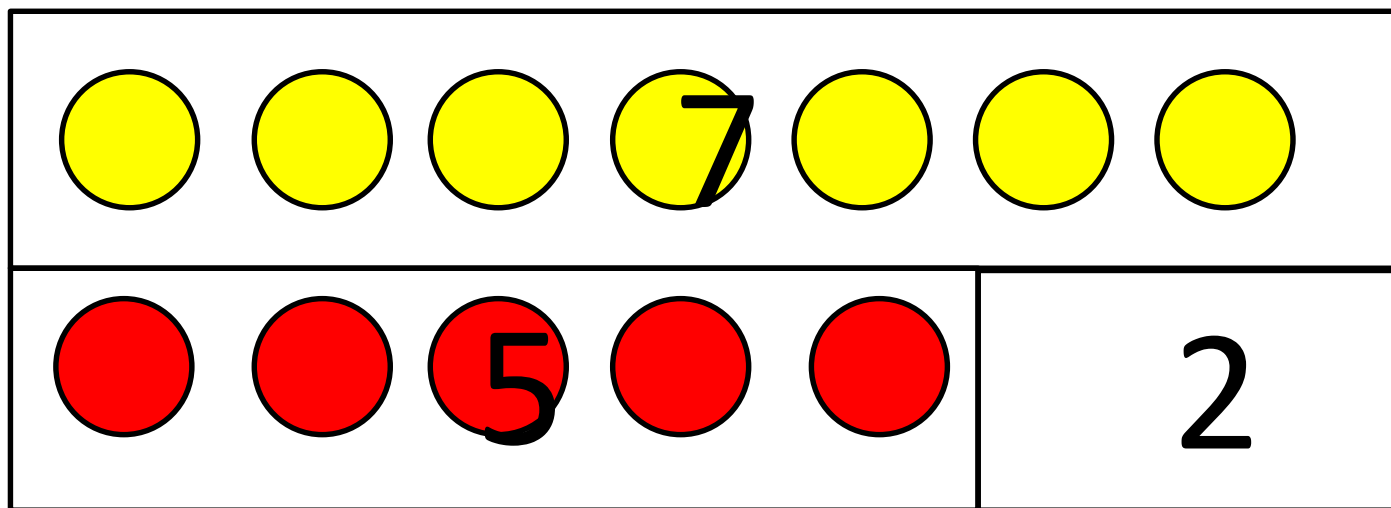There are 7 yellow flowers and 5 red flowers.

How many more yellow flowers are there than red flowers?

How many fewer red flowers are there than yellow flowers?

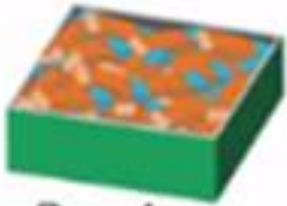**What's the difference** between the number of yellow flowers and red flowers?
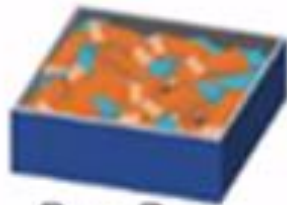
Modelling the difference

We can model the difference with paper strips or Cuisenaire too.

- We can model anything that we want to compare.

Comparison model
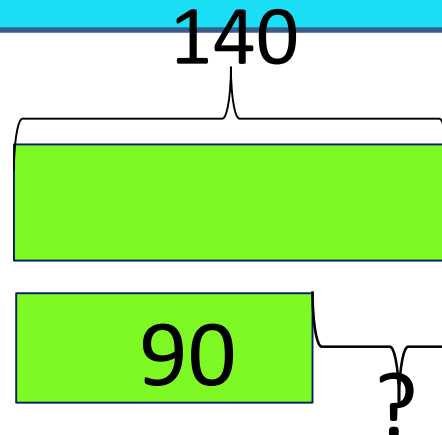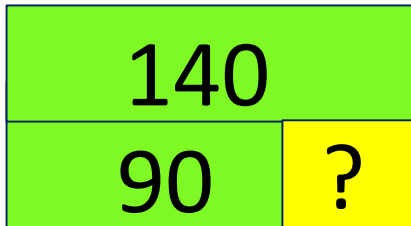
Box A

Box B

There are two boxes of rubbers.
Box A has more rubbers than Box B.
Model this using strips of paper or Cuisenaire.

140

140

90 | ?

90

?

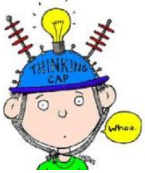# Solving word problems – Mass

The mass of a pear is 135g.

A watermelon is 375g heavier than the pear.
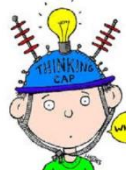
What is the mass of the watermelon?

What might the bar model look like?

The mass of the watermelon is ___ grams.

Comparison model – getting harder!
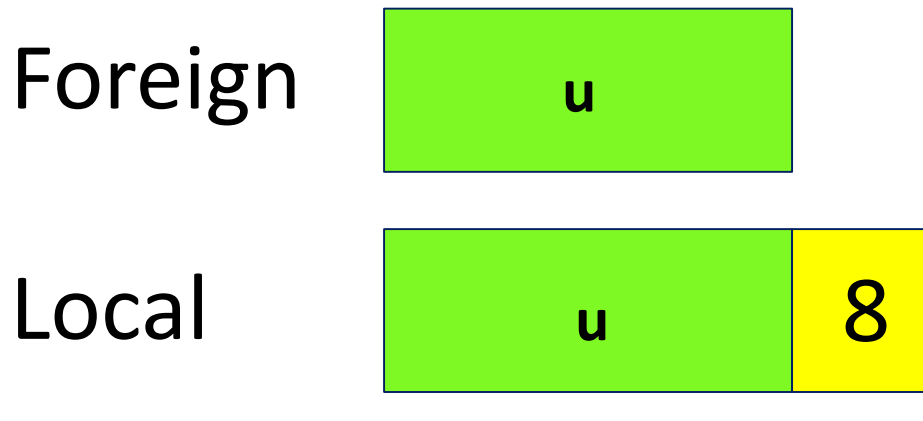
Sally has some local coins and some foreign coins.

She has 48 coins in total. She has 8 more local coins than foreign coins.

Foreign [u]

Local [u | 8]

48

Use the unitary method!
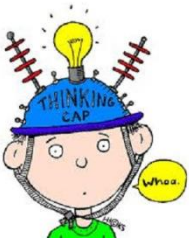
$48 - 8 = 40$
$2u = 40$
$u = 20$

Is this a correct diagram?
How could I show that Sally has 8 more local coins?

How many foreign coins does Sally have?

How many local coins does Sally have?

The Bar Model
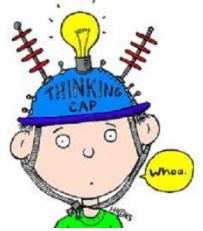
Using with multiplication, division and fractions...
and combinations of the above!

Part-whole model for multiplication and division
Equal groups

Charles has to arrange some chairs in 4 rows.

Each row has 8 chairs.

How many chairs are there altogether?

The total mass of 5 bags of flour is 40 kg.

Each bag of flour has the same mass.

What is the mass of each bag of flour?

Multiplication and division Comparison model
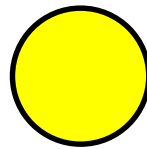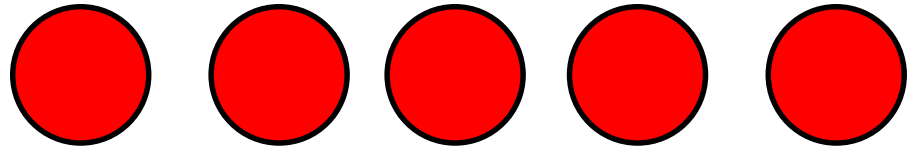
Peter has 4 books.

Harry has five times as many books as Peter.

Model with counters or Cuisenaire rods.

Peter's books ⬤

Harry's books ⬤ ⬤ ⬤ ⬤ ⬤

What questions could we ask?

How many books does Harry have?

How many books do they have altogether?

How many more books than Peter does Harry have?

How many books should Harry give Peter for them to have an equal amount of books?

Ralph posts 40 letters, some of which are first class, and some are second.

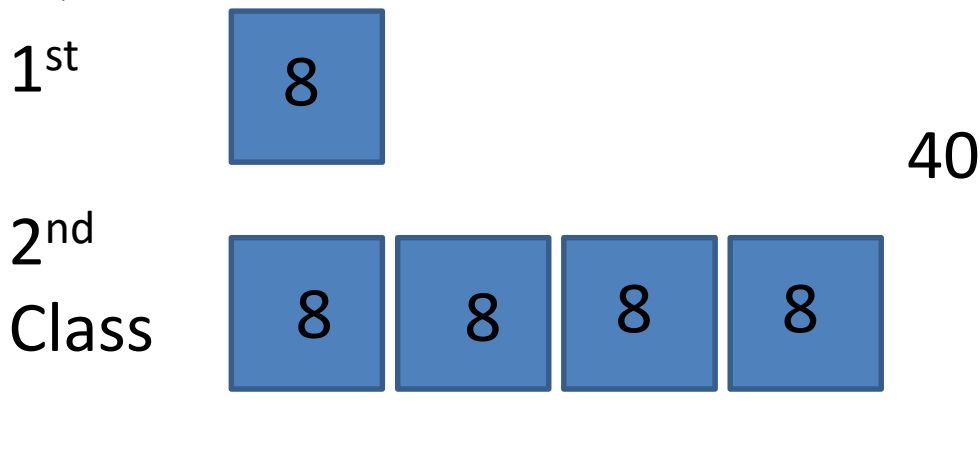He posts four times as many second class letters as first.

How many of each class of letter does he post?

...sts four times as many second class ...st. Model this with counters or paper. ...any of each class of letter does he post?

1st

| 8 |

40 | Ralph posts 40 letters

2nd

Class

| 8 | 8 | 8 | 8 |

40 ÷ 5 = 8   u = 8

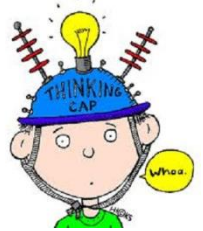1st Class → 8 letters

8 x 4 = 32   4u = 32

2nd Class → 32 letters
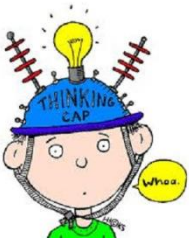
Bar models for fractions

Before we start…

arm yourself with a strip of paper!

Lauren has some cherries.

She eats 2 of them.

Then she eats half of what is left.

She now has 6 cherries.

How many cherries did she start with?

KS1

Bar models for fractions

Represent these problems with bar models

❶

The gardener planted some trees.

$\frac{2}{3}$ were apple trees.

The rest were pear trees.

There were 24 apple trees.

❷

The gardener planted some trees.

$\frac{2}{3}$ were apple trees.

The rest were pear trees.

There were 24 pear trees.

❸

The gardener planted some trees.

$\frac{2}{3}$ were apple trees.

The rest were pear trees.

There were 24 trees.

What do you notice? What's the same? What's different?

There's no need to solve these problems.
Just modelling problems is great experience.

24 In a class, 18 of the children are girls.

A quarter of the children in the class are boys.

Altogether, how many children are there in the class?

Show your working

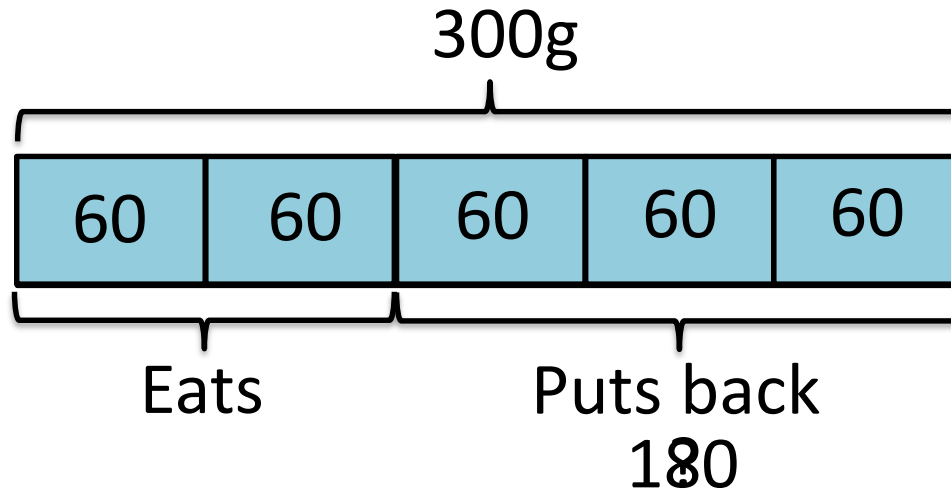With the bar model embedded, Year 3 could easily solve this!

Change model for fractions

Matthew has a 300g block of cheese. He eats $\frac{2}{5}$ of the cheese and puts the rest back in the fridge.

How much cheese did Matthew put back in the fridge?

Model

300g

| 60 | 60 | 60 | 60 | 60 |

Eats   Puts back

180

Calculations

$300 \div 5 = 60$

$3 \times 60 = 180$