



# Mastery Approaches to Maths MA2M+

Facilitators: Pete Boyd   Rebecca Davies   Mark Moody

Tuesday 26<sup>th</sup> June 2018: Mastery Approaches to Maths – Principles

Tuesday 2 October 2018: Mastery Approaches to Maths: In your classroom

Tuesday 6 November 2018: Mastery Approaches to Maths: Lessons from Shanghai

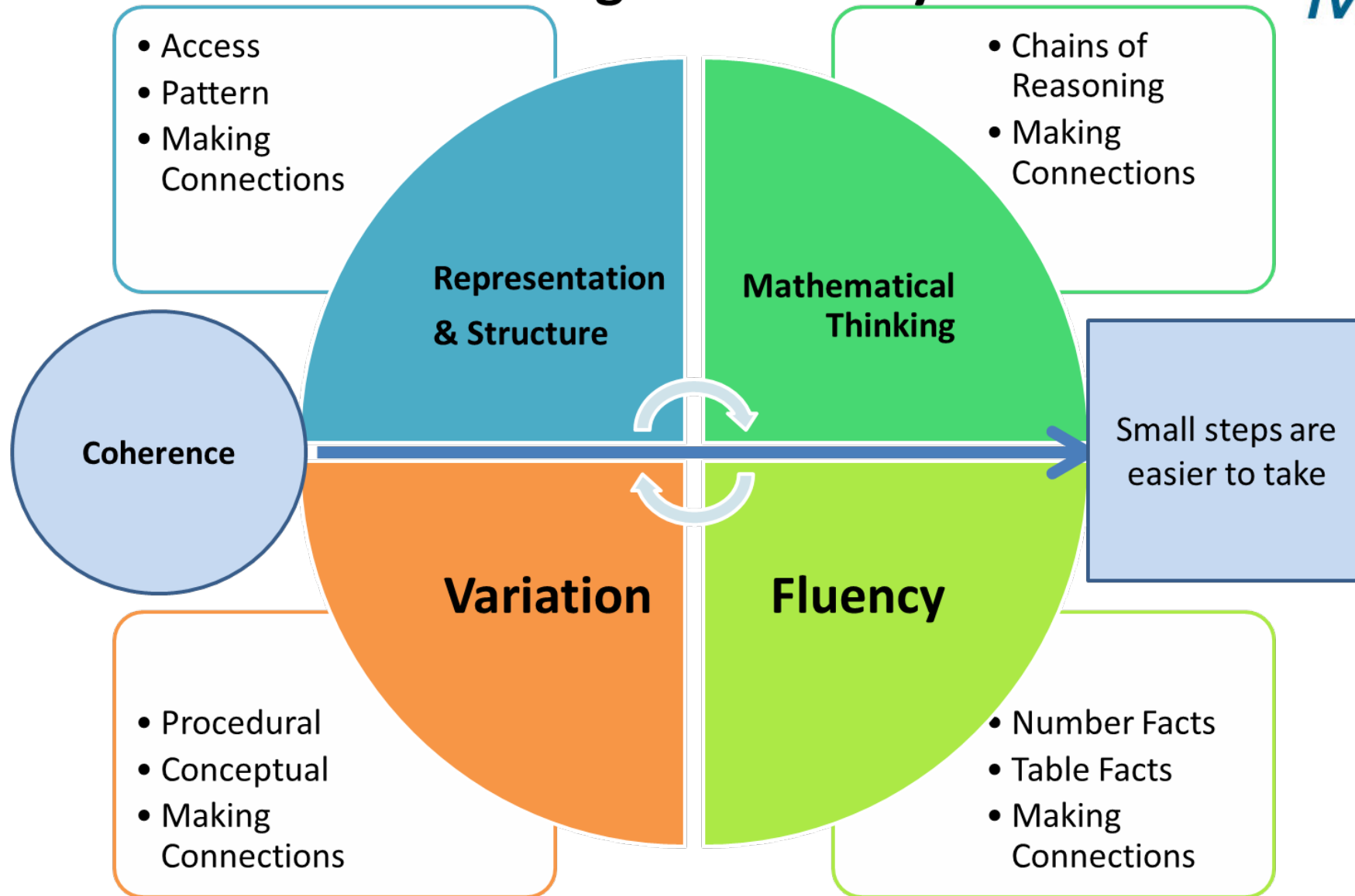
Tuesday 5 February 2019: Mastery Approaches to Maths: Greater depth

Tuesday 19 March 2019: Mastery Approaches to Maths: Next steps

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# 5 big ideas

## Teaching for Mastery





Representation  
and Structure

# The Bar Model

A farmer has 242 goats and sheep in total.  
He sells half of the goats and buys 28 more sheep.  
In the end he has three times as many sheep as goats.  
How many sheep did he have to start with?

**BARVENBER**



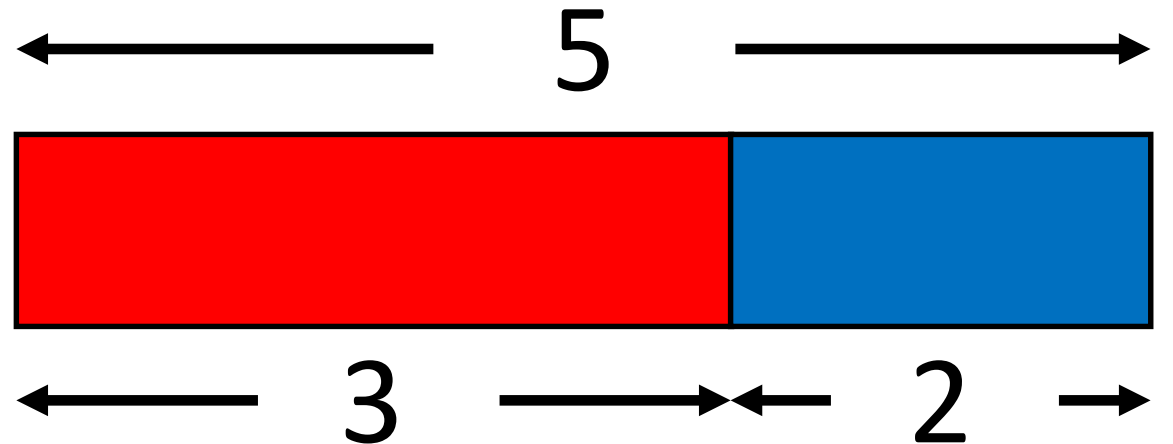
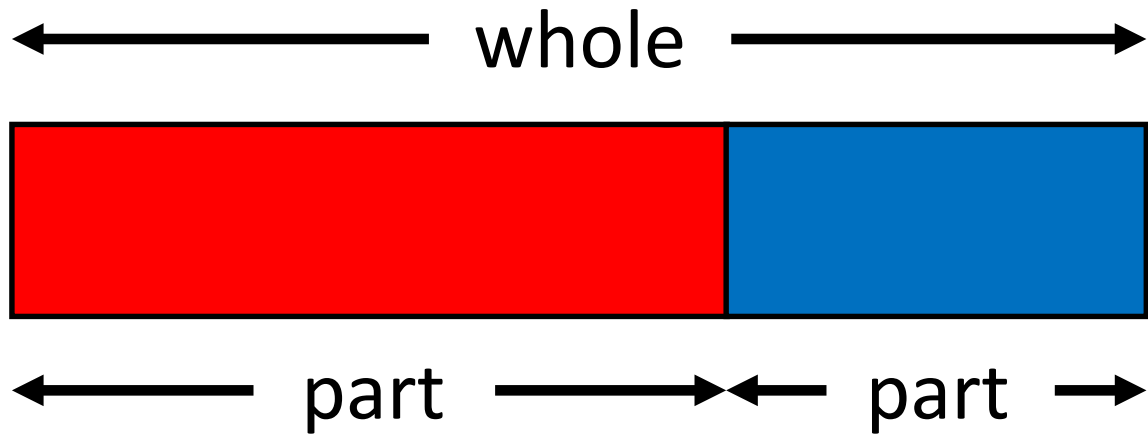
# The Bar Model

- a way of revealing the **mathematical structure** within a problem
- enables children to gain insight and clarity as to how to solve it
- supports the transformation of real life problems into a mathematical form
- bridges the gap between **concrete** mathematical experiences and **abstract** representations
- It can be used to represent problems involving
  - the four operations
  - ratio and proportion
  - unknowns in a problem



# The Bar Model

## Part – Whole: Addition and Subtraction



$$5 = 3 + 2$$

$$5 = 2 + 3$$

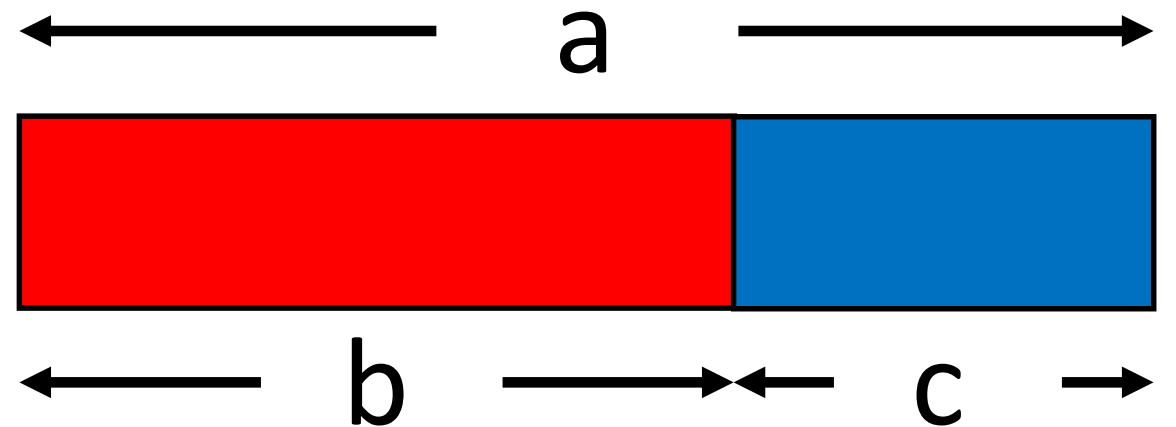
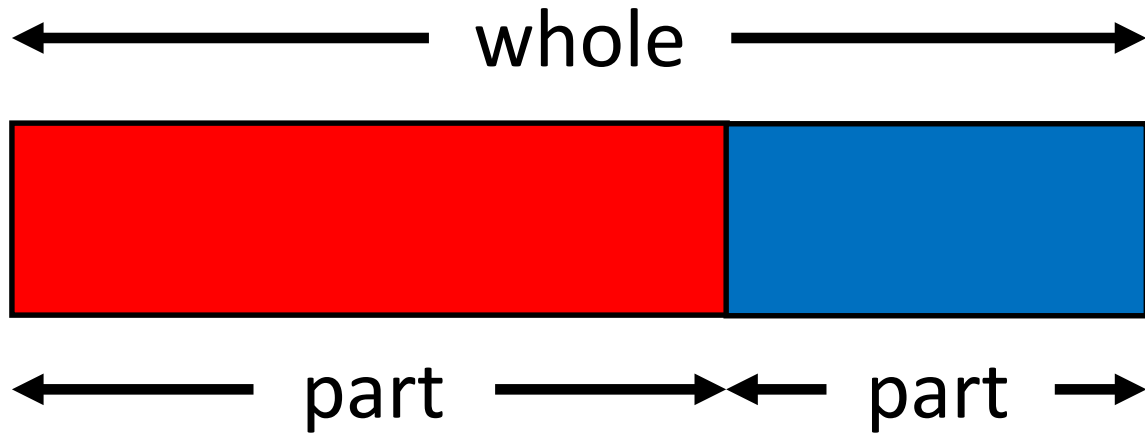
$$3 = 5 - 2$$

$$2 = 5 - 3$$



# The Bar Model

## Part – Whole: Addition and Subtraction



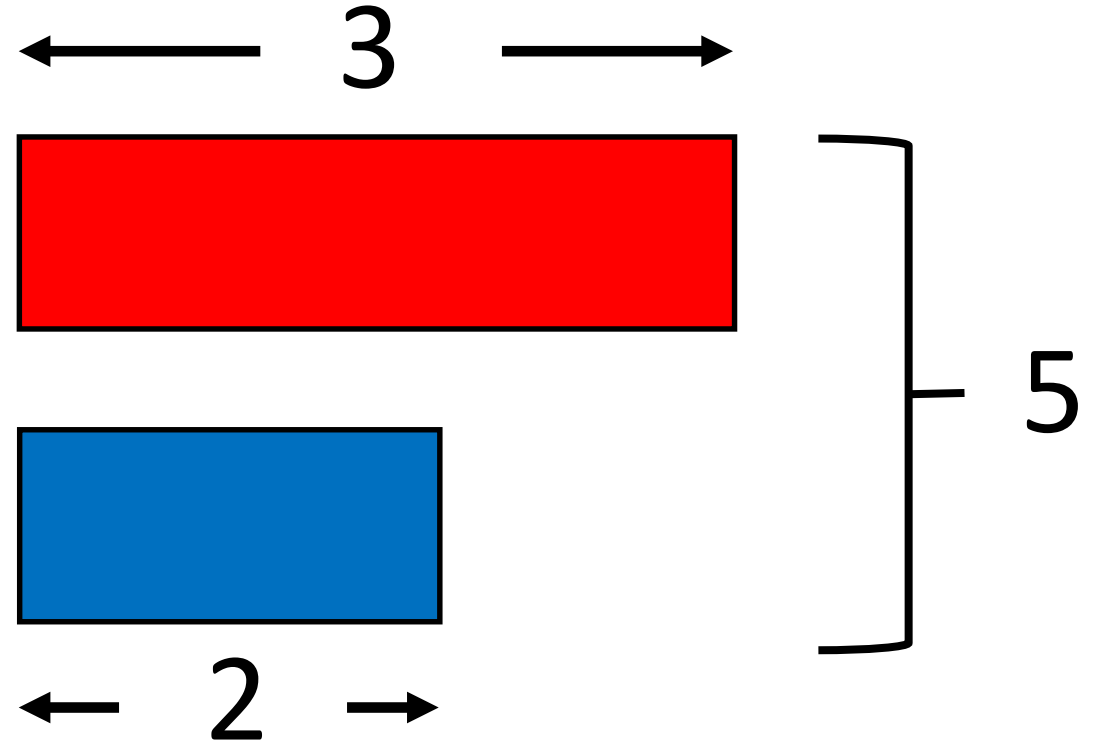
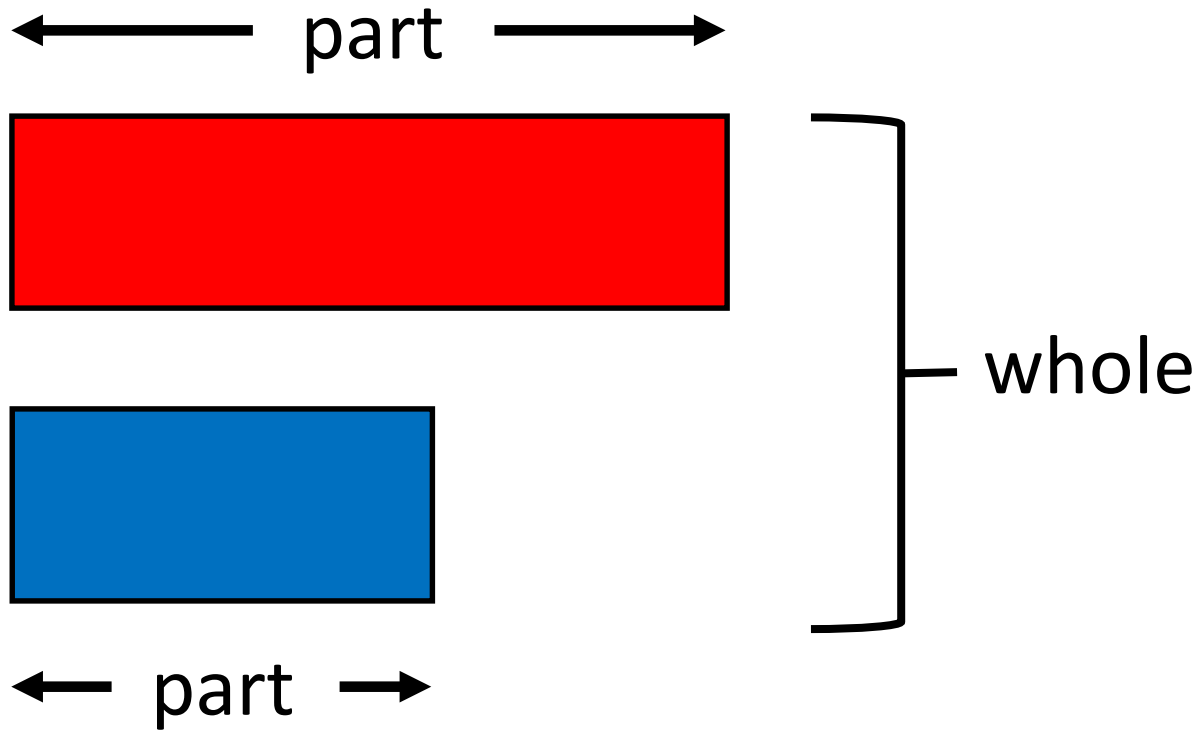
$$a = b + c \quad a = c + b$$

$$b = a - c \quad c = a - b$$



# The Bar Model

## Comparison: Addition and Subtraction



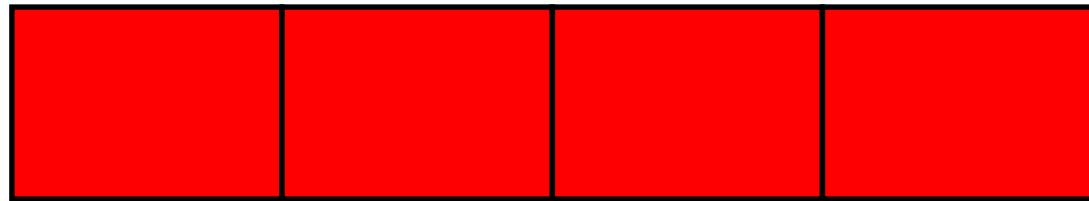




# The Bar Model

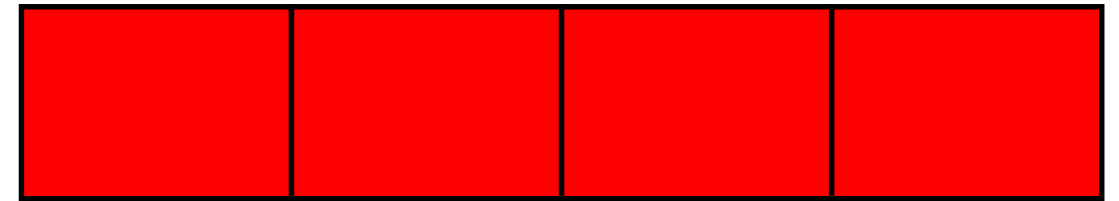
## Part – Whole: Multiplication and Division

← whole →



← part →

← 24 →



← 6 →

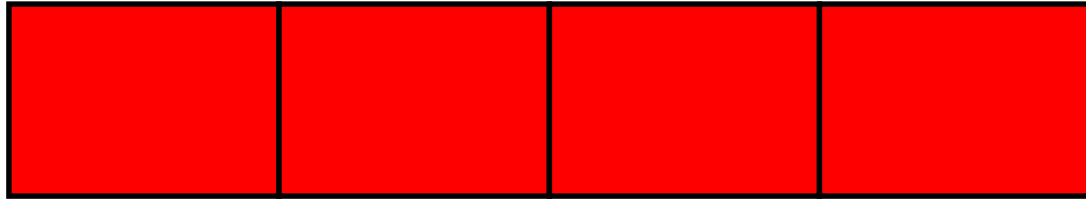
$$24 = 6 \times 4 \quad 6 = \frac{24}{4}$$

$$24 = 4 \times 6 \quad 4 = \frac{24}{6}$$

# The Bar Model

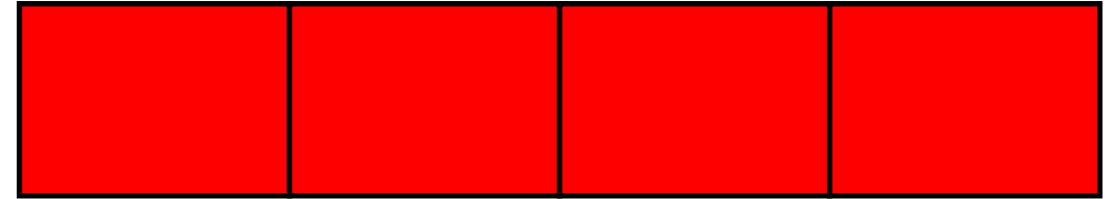
## Comparison: Multiplication and Division

← whole →



← part →

← 24 →

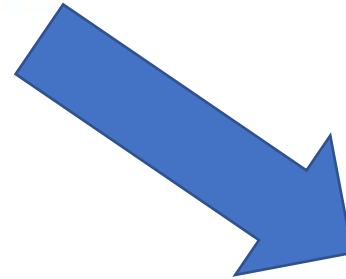


← 6 →



  
*Maths*  
**HUBS**  
White Rose

  
*MathsHUBS*



  
*MathsHUBS*  
West Yorkshire

**White Rose Maths**

**BARVENBER**

# BARVENBER

1 Sam sells ice-creams.

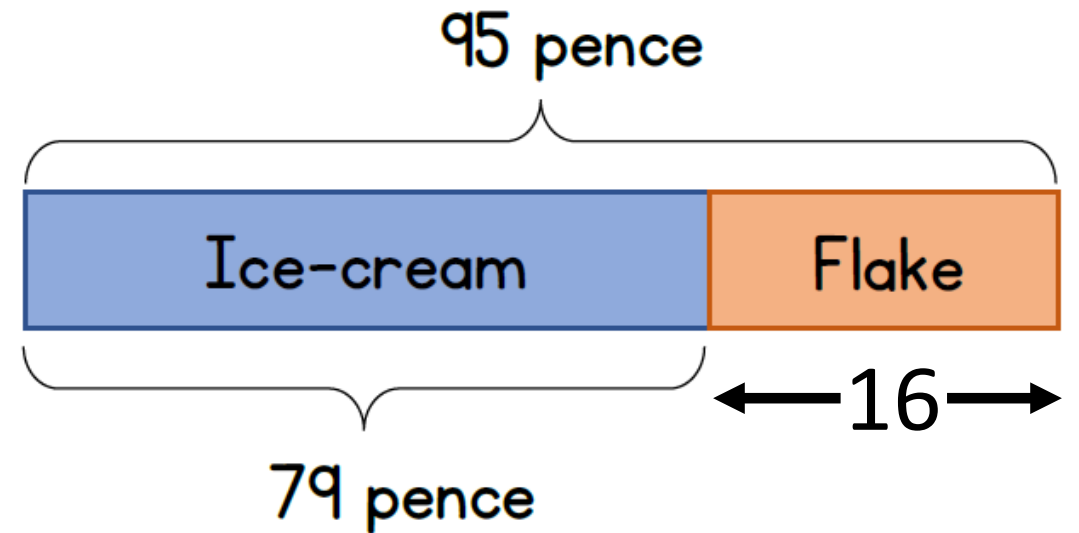


Ice-cream  
79 pence



Ice-cream and flake  
95 pence

How much does the chocolate flake cost?



$$95 - 79 = 16$$

# BARVEMBER

2 Mo has 75 grapes.

He gives 17 to his mum and 23 to his dad.

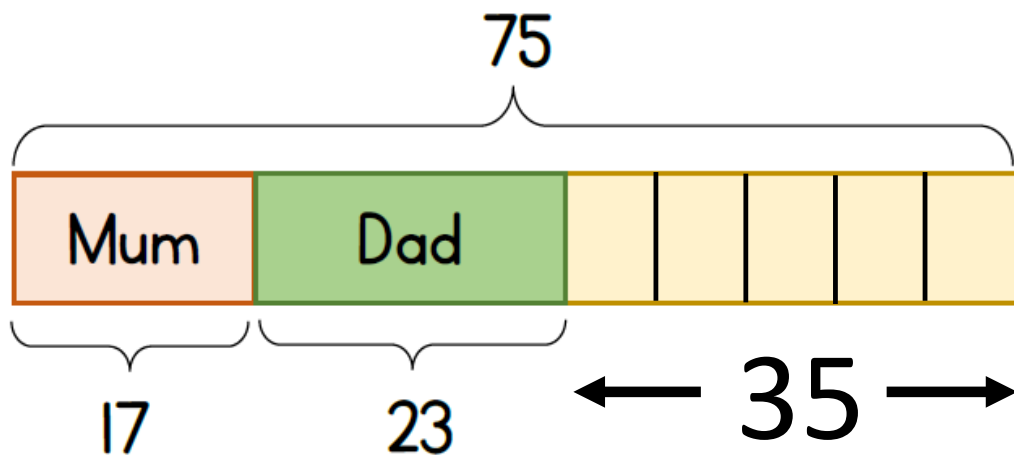
He shares the rest between his 5 friends.

How many grapes does each friend receive?

$$17 + 23 = 40$$

$$75 - 40 = 35$$

$$\frac{35}{5} = 7$$



# BARVENBER

3 Dionne has  $\frac{1}{2}$  as many beanbags as Fred.

Fred has  $\frac{1}{3}$  as many beanbags as Sara.

Sara has 84 more beanbags than Fred.

How many beanbags are there in total?

Dionne 

21
----

Fred 

21	21
----	----

 ← 84 →

Sara 

42	42	42
----	----	----

$$\frac{84}{2} = 42$$

$$\frac{42}{2} = 21$$

$$21 \times 3 = 63$$

$$42 \times 3 = 126$$

$$126 + 63 = 169$$

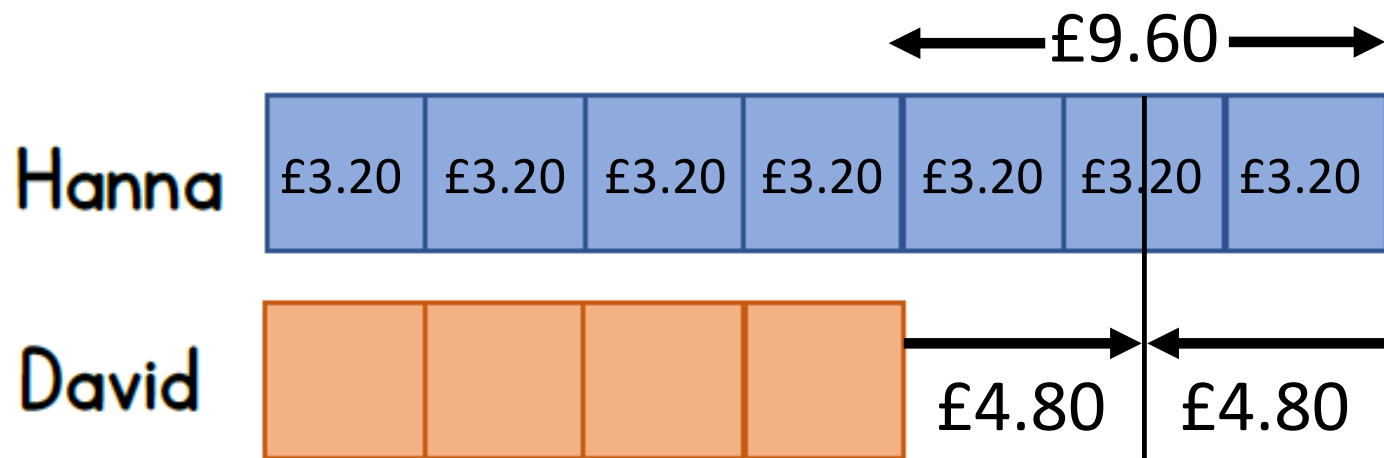
# BARVEMBER

4 Hanna and David each have some money.

The ratio of Hanna's to David's money is 7 : 4

If Hanna gives David £4.80 they will have the same amount of money.

How much did Hanna have at the start?



$$£4.80 \times 2 = £9.60$$

$$\frac{£9.60}{3} = £3.20$$

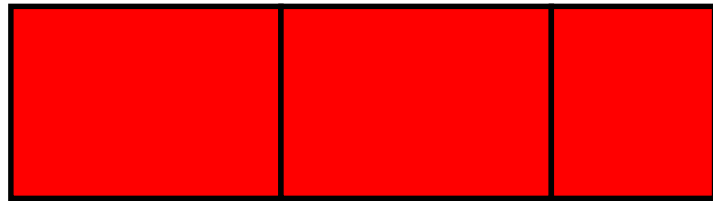
$$£3.20 \times 7 = £22.40$$

12

$$n = 22$$

What is  $2n + 9$ ?

$\leftarrow n \rightarrow \leftarrow n \rightarrow \leftarrow 9 \rightarrow$



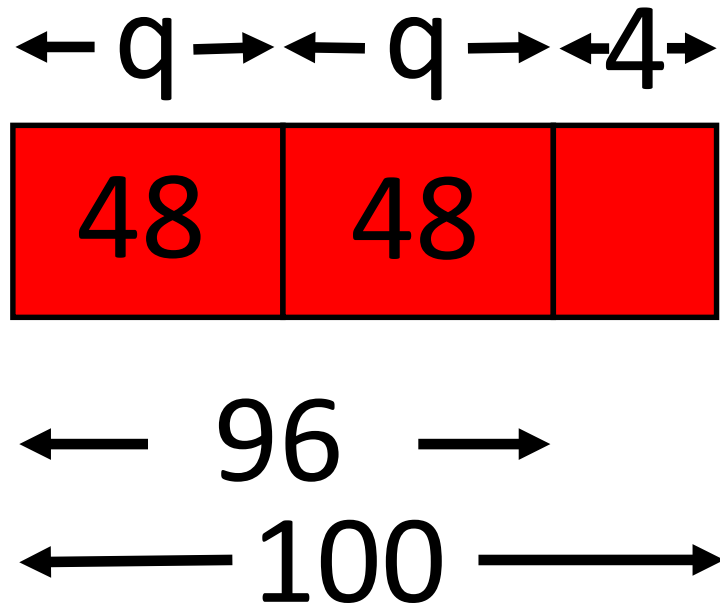
$\leftarrow 22 \rightarrow \leftarrow 22 \rightarrow \leftarrow 9 \rightarrow$

$$22 + 22 + 9 = 53$$



$$2q + 4 = 100$$

Work out the value of  $q$ .



$$100 - 4 = 96$$

$$\frac{96}{2} = 48$$

$$q = 48$$



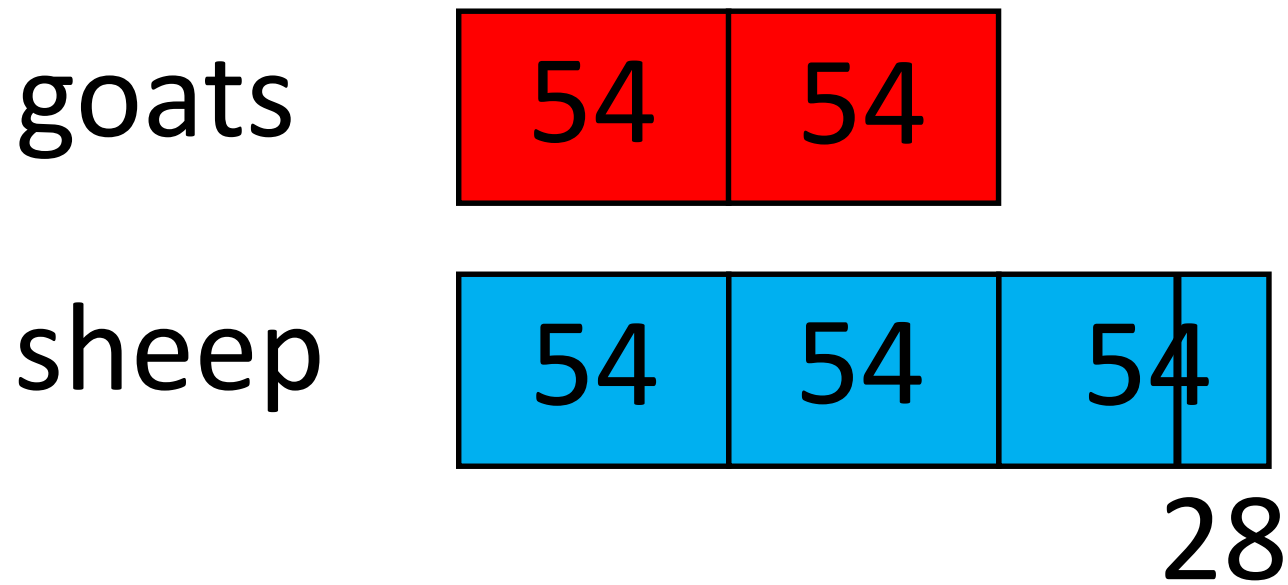
# BARVEEMBER

A farmer has 242 goats and sheep in total.

He sells half of the goats and buys 28 more sheep.

In the end he has three times as many sheep as goats.

How many sheep did he have to start with?



$$242 + 28 = 270$$

$$\frac{270}{5} = 54$$

$$54 \times 3 = 162$$

$$162 - 28 = \mathbf{134}$$

242 + 28



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