Good evening!
Thank you for coming.

While you are waiting, please help yourself to refreshments.

Here are some comments we received from external Head Teachers, Senior Leaders and teachers from across West Yorkshire for our recent Primary Showcase:

"Providing you with the opportunity to visit primary schools with exceptional maths practice and be inspired by what you experience and see!" Maths Hub invitation

Pupils confident and focused.

Pupil engagement and deeper understanding.

Meeting needs of full range of abilities.

Instant engagement.

Practical.

Maths at Moorlands.
A focus on Bar Modelling

Karen Chapman and Hannah Woodhouse

Maths Leaders Moorlands Primary School

With thanks to Paul Rowlandson

Assistant Principal

Trinity Academy Halifax

How do we know what to teach?

- New National Curriculum in 2014
- Series of Year Group Expectations YGEs (sometimes referred to as AREs) for every year group-available on our website
- Mastery of an objective, depth to understanding

How do we teach?

- Calculations Policy-draft but under review to simplify and become more uniformed
- Practical resources-Maths Trollies
- Visual via Maths based software/teacher developed Interactive White Boards
- Intuitive and imaginative teacher ideas!

Where are we going…

- Shanghai and Singapore!
- Mastery approach being trialed
- Bar Modelling
- Maths Project

Maths Hub

- Working along side the Maths Hub
- Taken part in Primary Showcase where 15 schools from across Yorkshire visited including Head Teachers
- Leading a Maths Project-6 schools across Huddersfield

‘What impact does Bar Modelling have on the approach to problem solving with Fractions?’

Where do we want to go?

Bar Modelling!

What Are Bar Models?

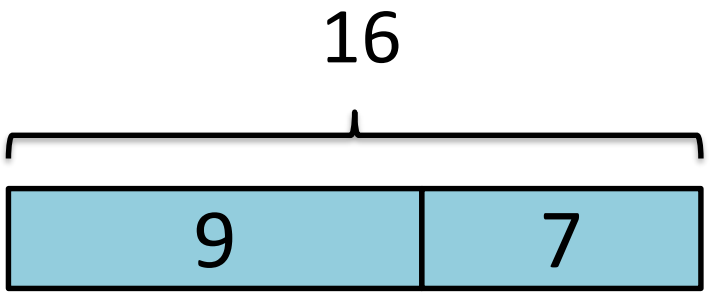
What Are Bar Models?

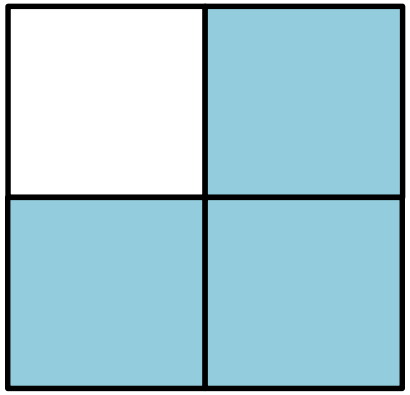
"In as early as the 4th grade, algebra story problems begin to appear."

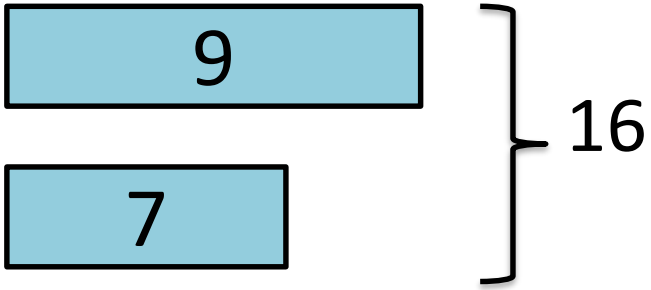
"These strip diagrams make it possible for children who have not studied algebra to attempt remarkably complex problems."

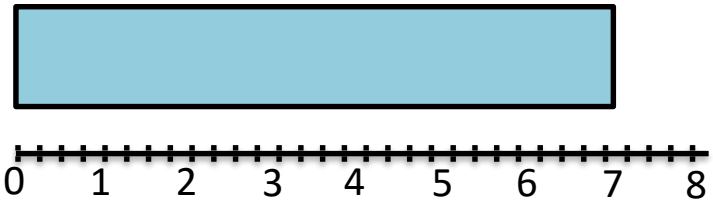
Beckmann (2004)

What Are Bar Models?

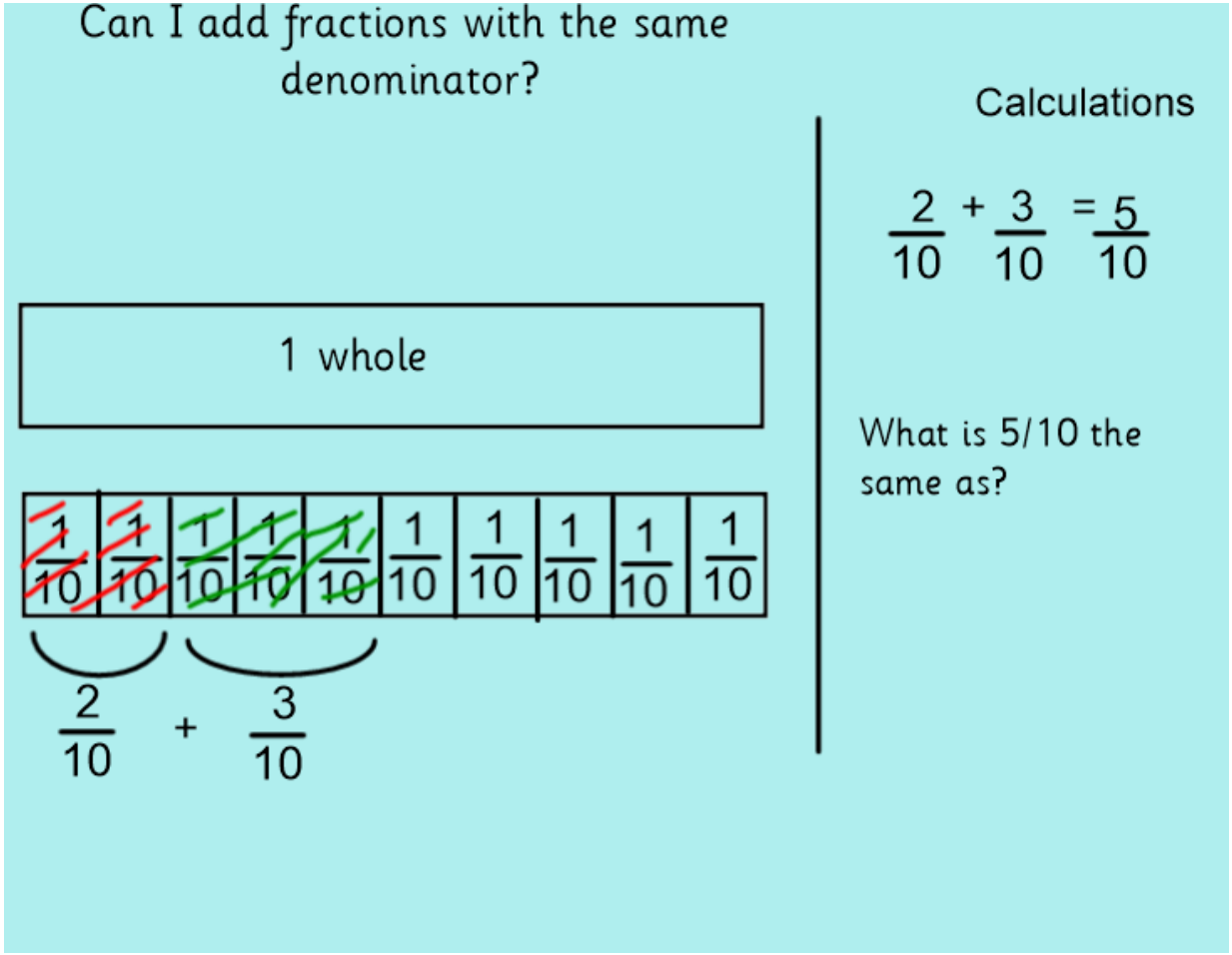








Examples in use at Moorlands



Why use Bar models?

Teachers are brilliant at coming up with ideas and images! E.g. pizzas for fractions, purses for money, sweets for division, arrays (egg boxes) for multiplication…the list goes on!

How Can They Be Used?

"Although bar models will not always help children carry out required calculations, they are clearly designed to help children decide which operations to use. Instead of relying on superficial and unreliable clues like key words, the simple visual diagrams help children understand why the appropriate operations make sense."

Beckmann (2004)

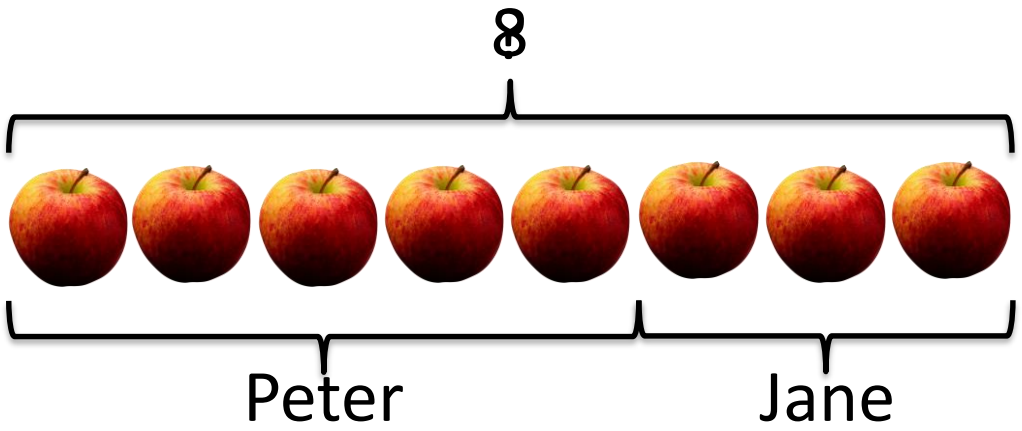
Models With a Single Bar ('Part-Whole Models')

Addition

Peter has 5 apples and Jane has 3 apples.

How many apples to they have altogether?

Model (Version 1)



Calculations

5 + 3 = 8

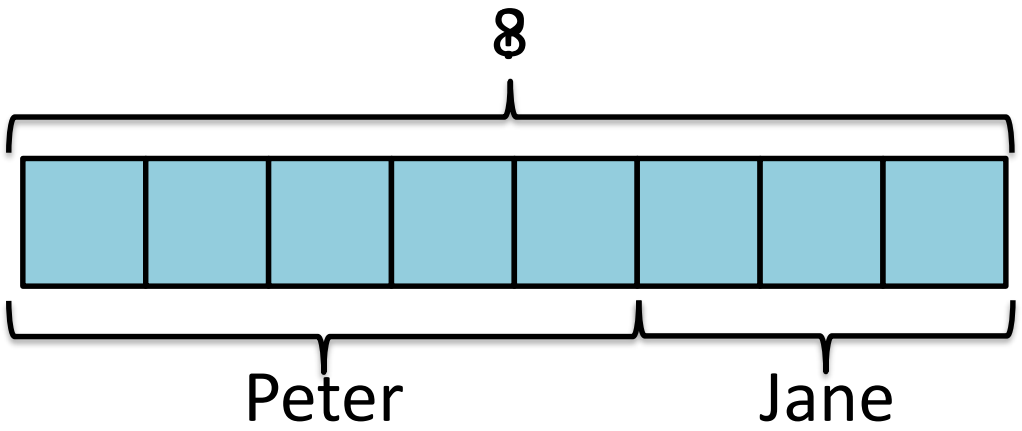
In this model, we are using actual objects or pictures of the objects.

Addition

Peter has 5 apples and Jane has 3 apples.

How many apples to they have altogether?

Model (Version 2)



Calculations

5 + 3 = 8

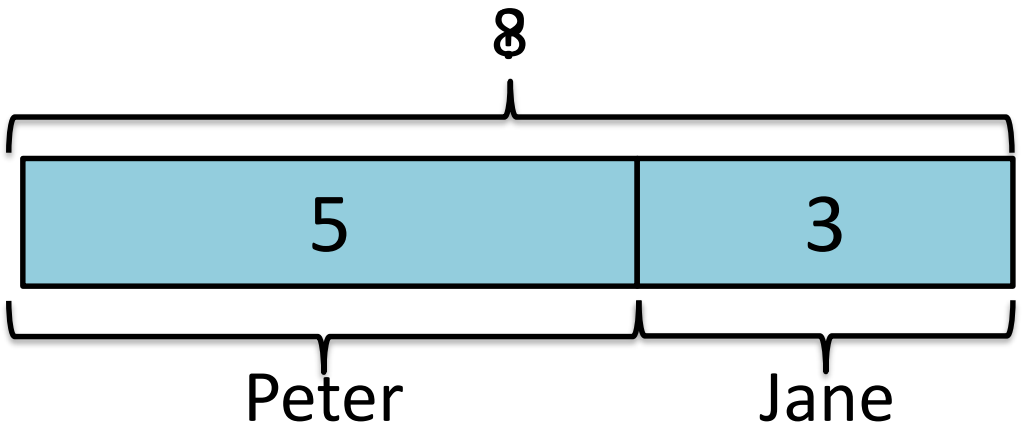
This is called a 'discrete bar model', where each box represents one whole.

Addition

Peter has 5 apples and Jane has 3 apples.

How many apples to they have altogether?

Model (Version 3)



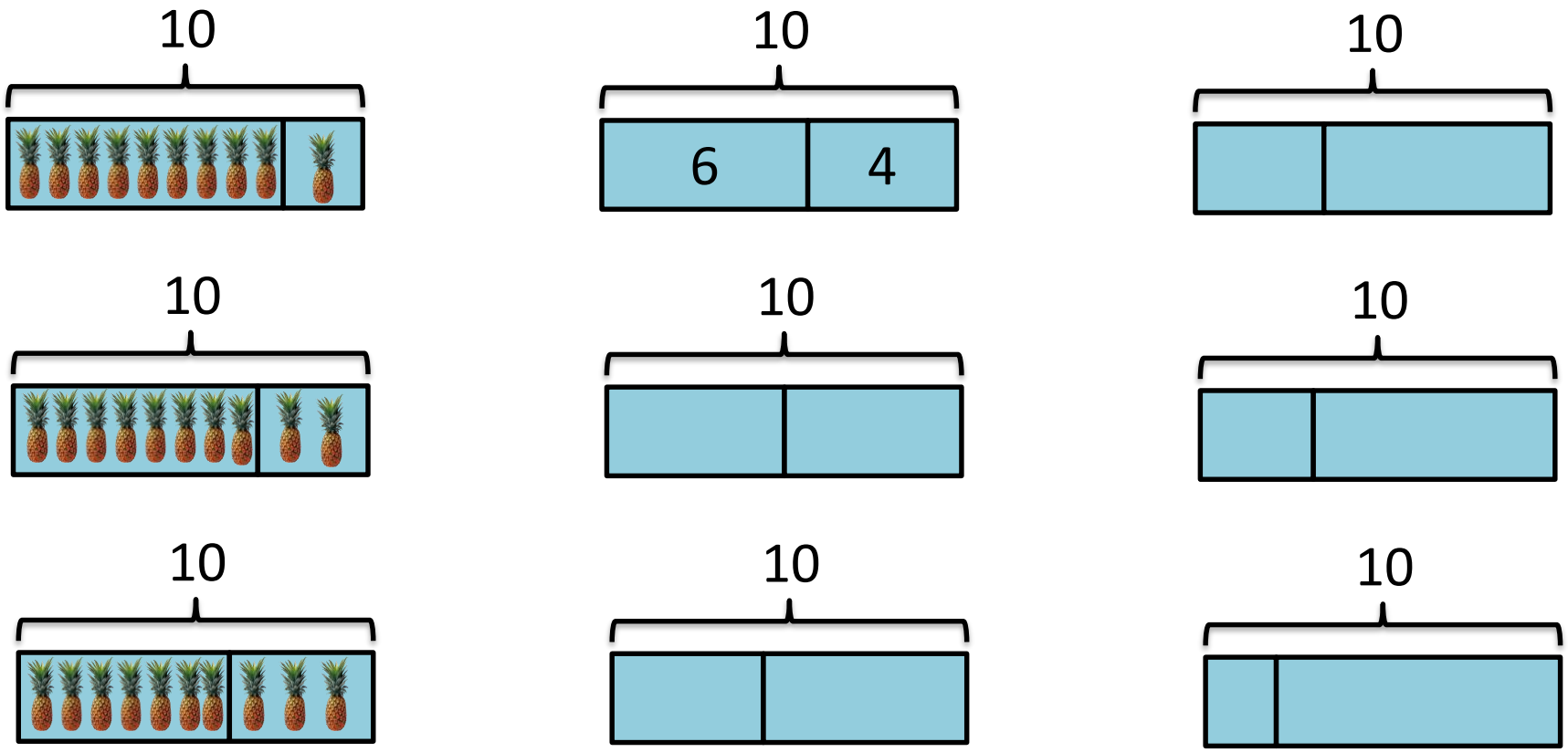
Calculations

5 + 3 = 8

This is called a 'continuous model', where each rectangle represents a number.

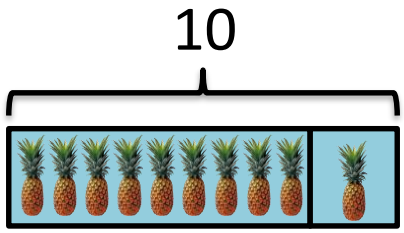
Addition

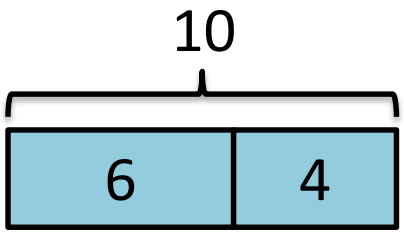
Number Bonds –here's an example a Year 1 child might be asked to do:
Can you complete the number bonds?

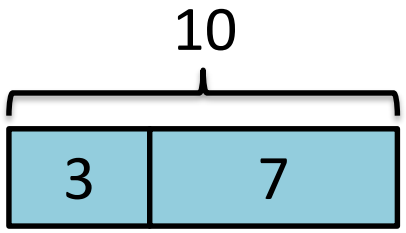


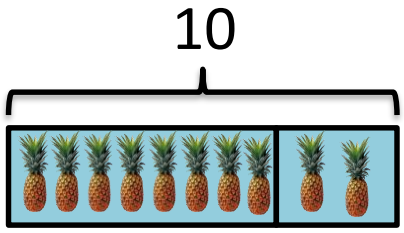
Addition

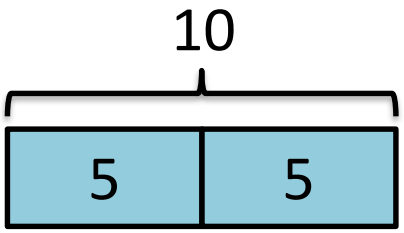
Number Bonds – can you complete the number bonds?

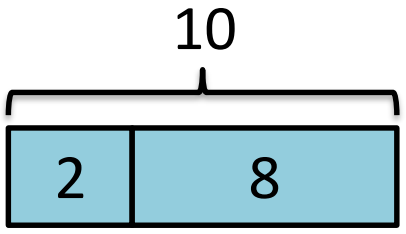


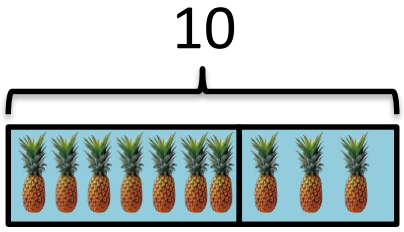


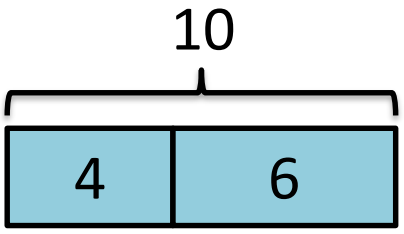


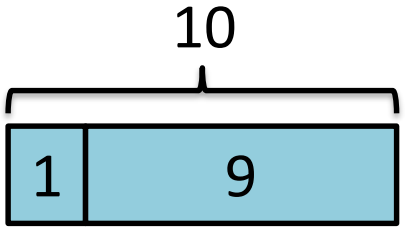












Concrete, Pictorial, Abstract

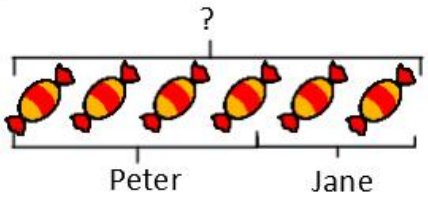
MathsHUBS White Rose

Keep children at the stage they need until ready to move on. Within a class children can be working on same calculation but accessing it in different ways.

Actual objects

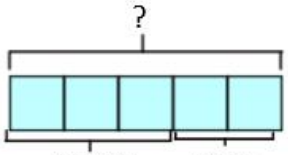
Counters

Pictures

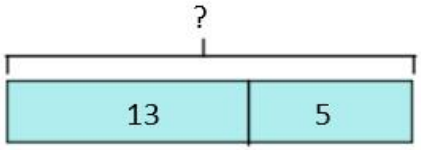


Stories & calculations

Squares



Bars

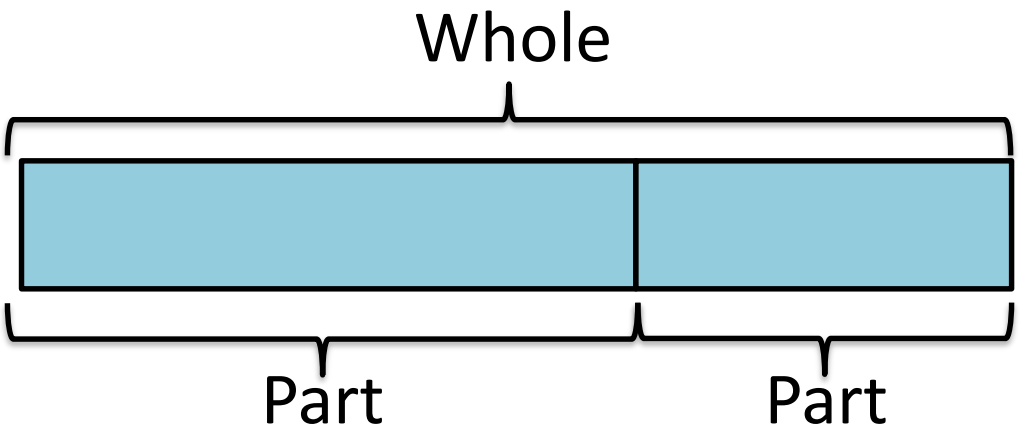


Calculations only

13 + 5 = ?

Teacher, pairs & independent

Terminology



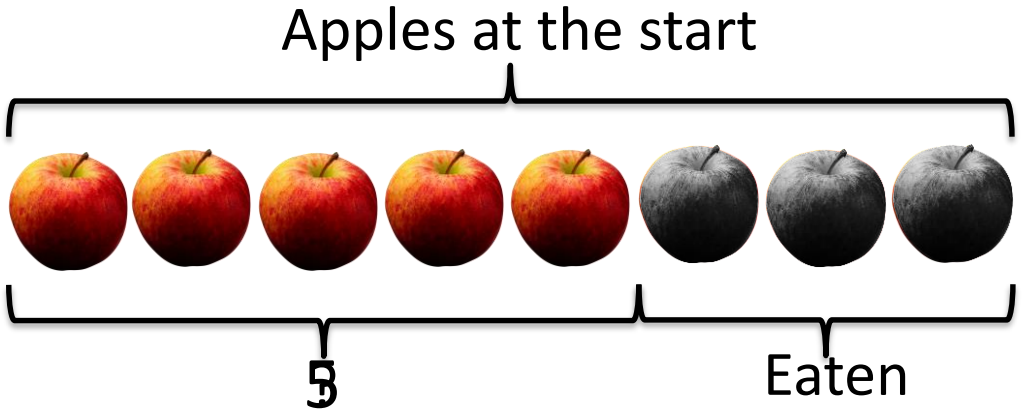
part + part = whole

whole - part = part

Subtraction

Jane has 8 apples to begin with. She then eats three apples. How many apples does she have left?

Model (Objects)



Calculations

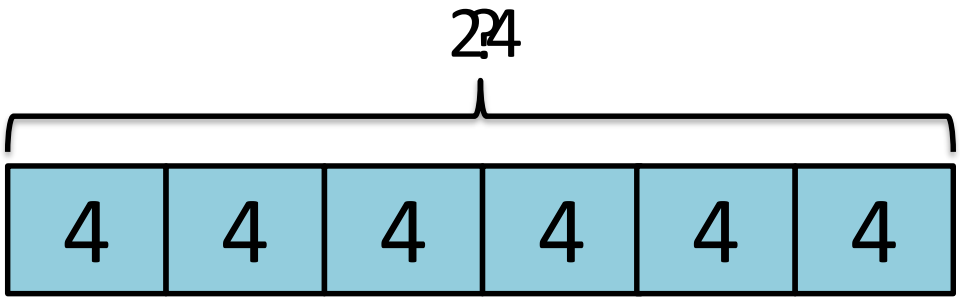
8 - 3 = 5

Multiplication

Muffins come in boxes of 4. Peter buys 6 boxes of muffins.

How many muffins does Peter buy all altogether?

Model



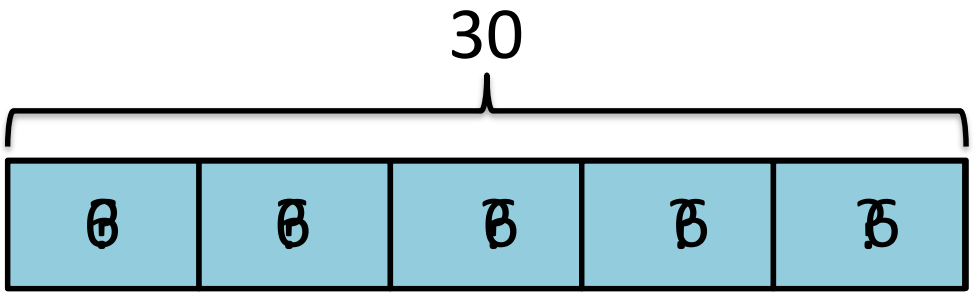
Calculations

4 X 6 = 24

Division (Version 1)

Jane has 30 cakes. She wants to share them equally between five boxes. How many should go in each box?

Model



Number of cakes in each box = 6

Calculations

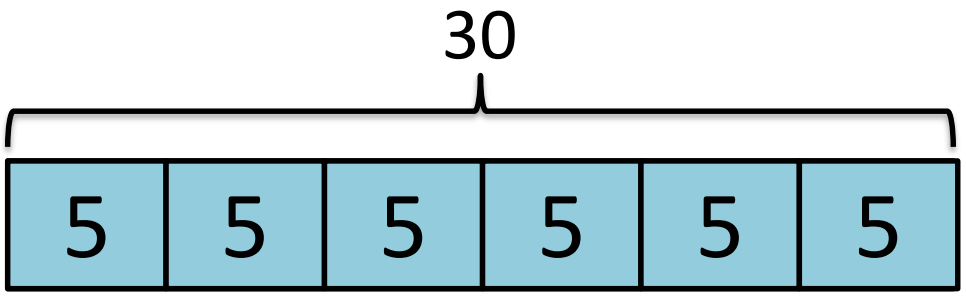
$30 \div 5 = 6$

In this version, we are splitting 30 into 5 equal groups.

Division (Version 2)

Jane has 30 cakes. She wants to pack them into boxes with 5 cakes in each box. How many boxes will she need?

Model



Number of boxes needed = 6

Calculations

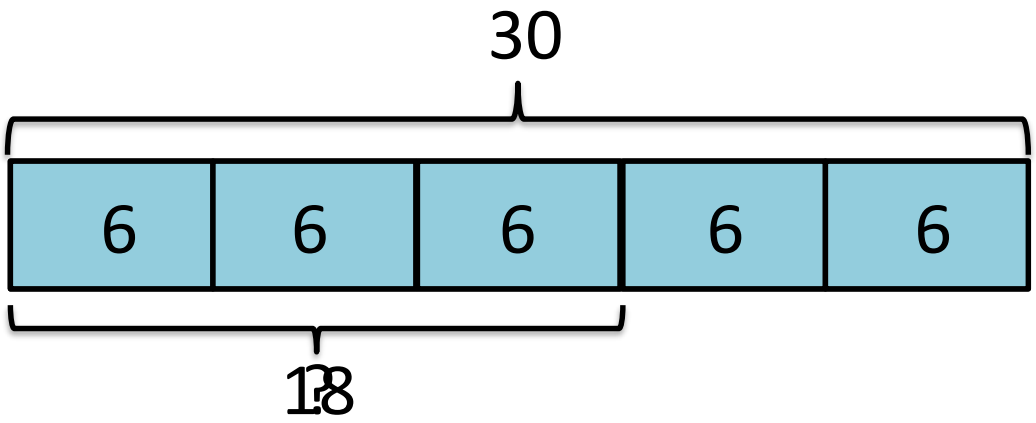
$30 \div 5 = 6$

In this version, we are counting how many fives go into thirty.

Fraction of an Amount

Peter starts with 30 sweets. He eats $\frac{3}{5}$ of them. How many sweets does he eat?

Model



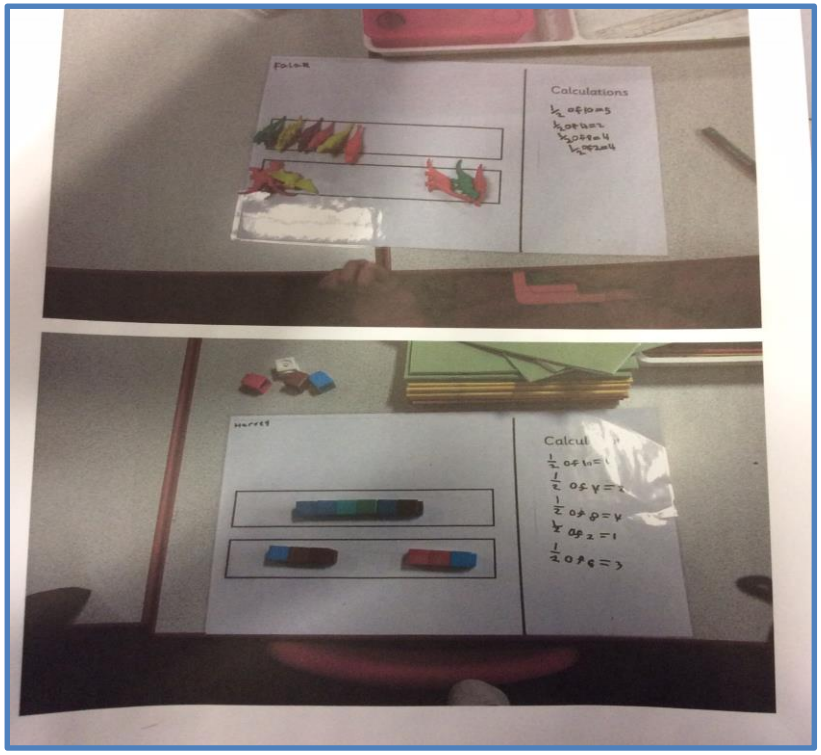
Calculations

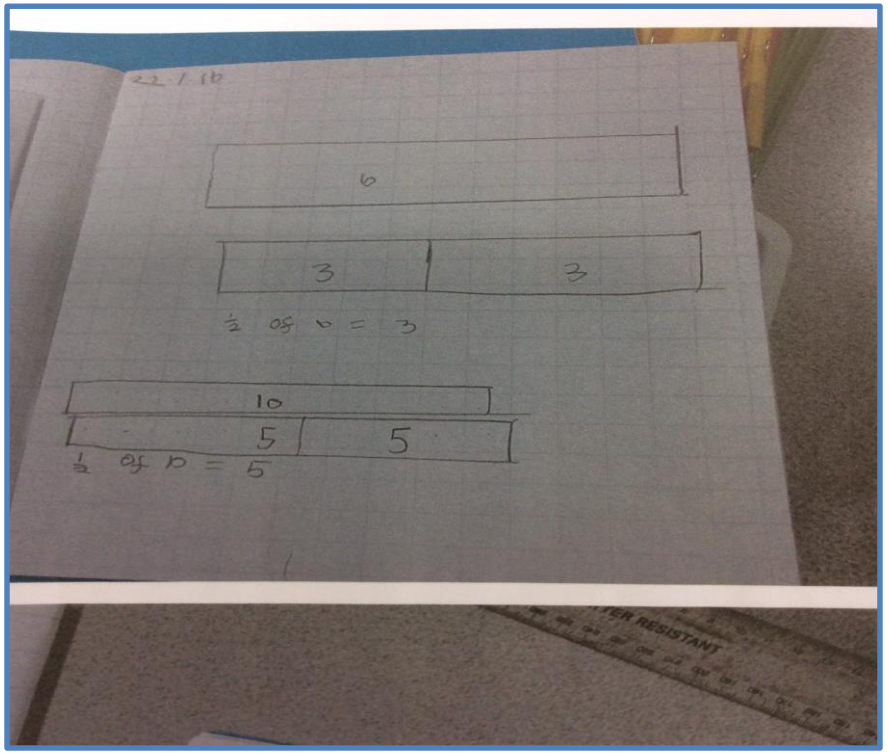
30 ÷ 5 = 6

6 x 3 = 18

Children's example

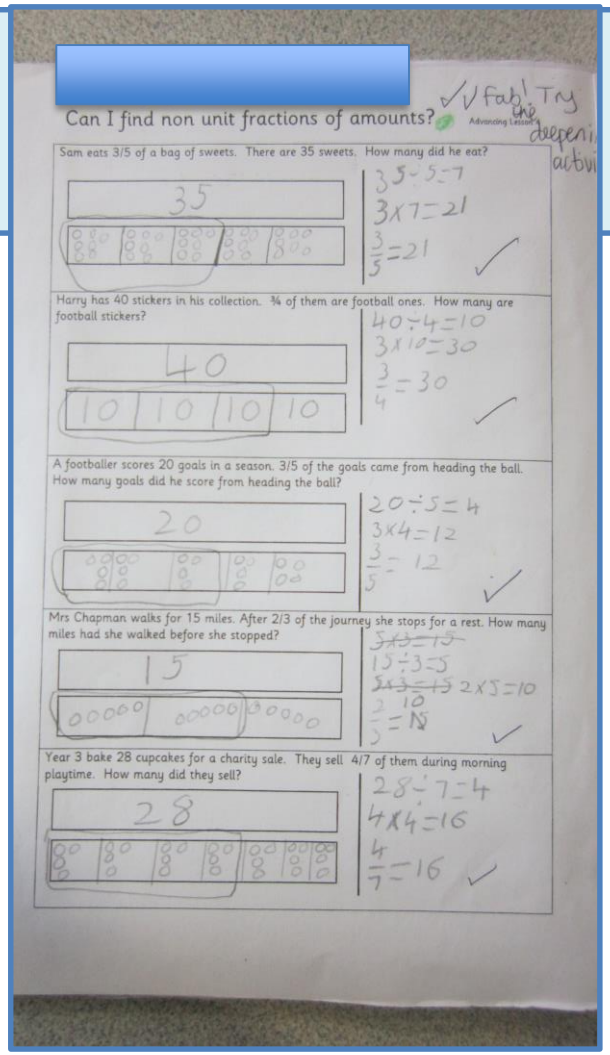
Year 1

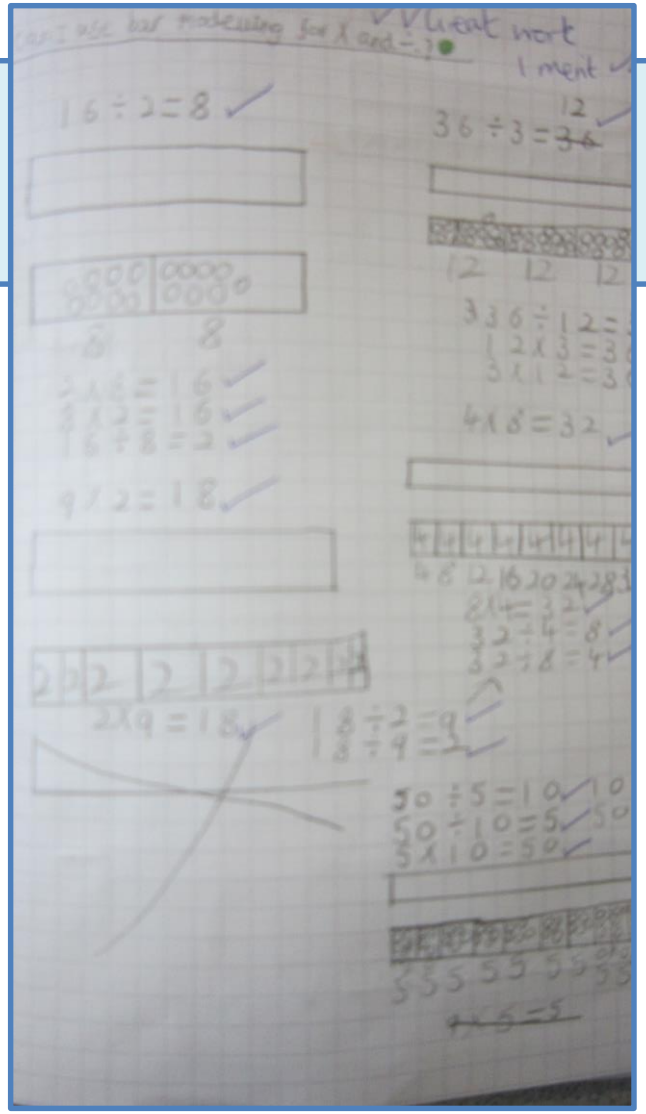




Children's example

Year 3





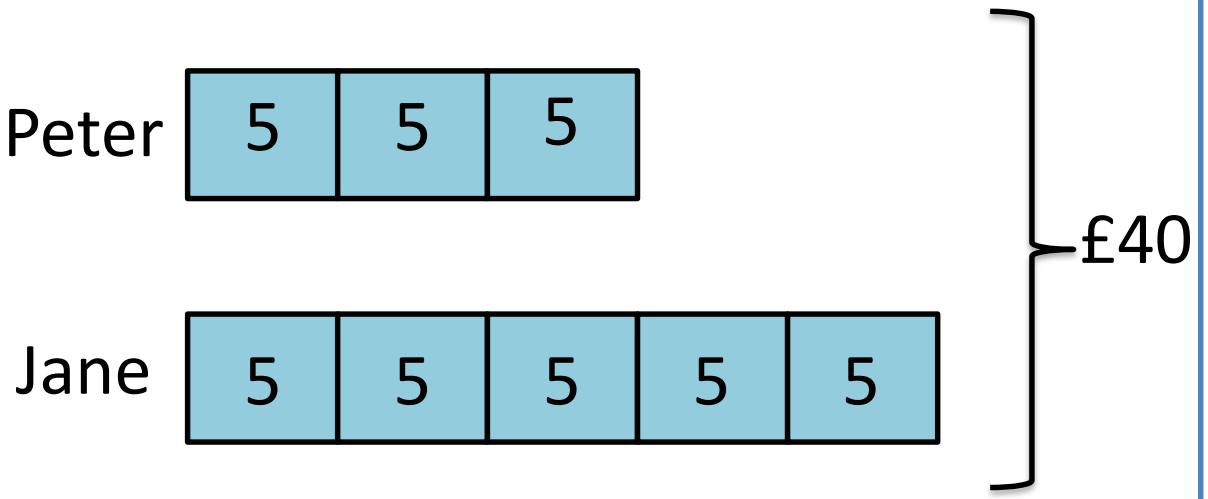
Models With More Than One Bar ('Comparison Model')

Ratio

Peter and Jane share £40 in the ratio of 3:5

How much money does each person get?

Model



Calculations

40 ÷ 8 = 5

Peter: 5x3 = 15

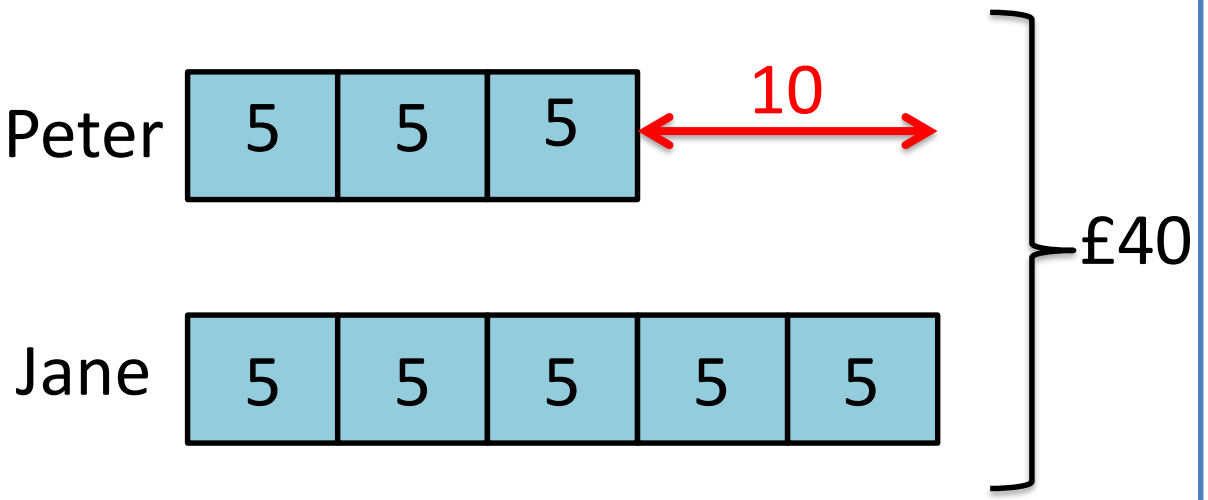
Jane: 5x5 = 25

Ratio

Peter and Jane share £40 in the ratio of 3:5

How much more money does Jane have than Peter?

Model



Calculations

40 ÷ 8 = 5

Peter: 5x3 = 15

Jane: 5x5 = 25

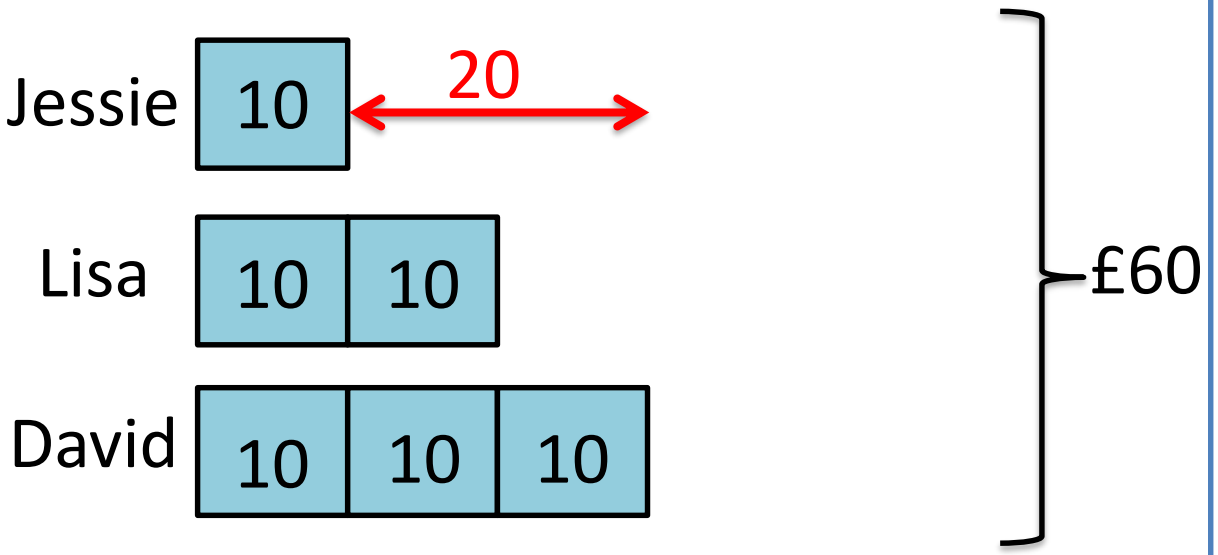
25 – 15 = 10

Ratio

Jessie, Lisa and David share £60 in the ratio of 1:2:3

How much more money does David get than Jessie?

Model



Calculations

60 ÷ 6 = 10

Jessie: 10x1 =10

Lisa: 10x2 = 20

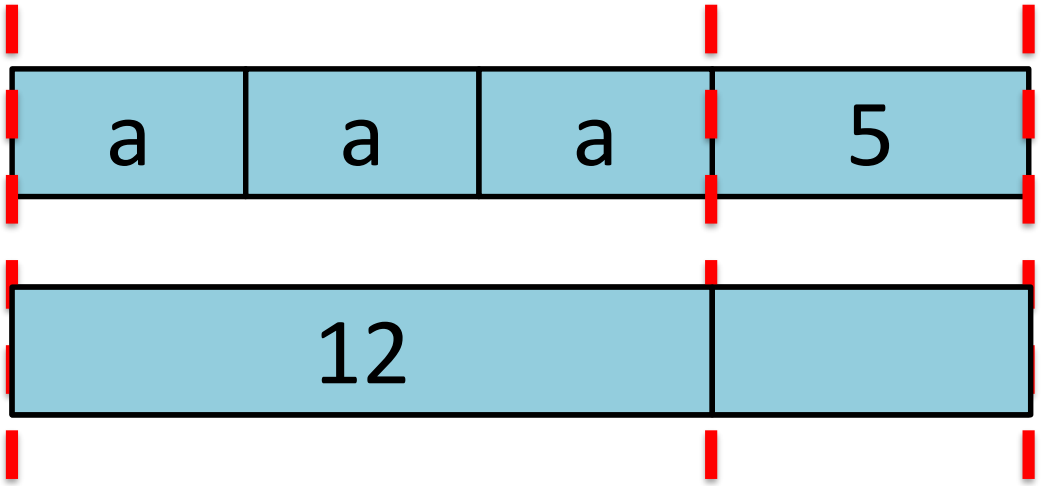
David: 10x3 = 30

30 – 10 = 20

Solving Equations

Solve… $3a + 5 = 17$

Model



Calculations

$3a + 5 = 17$

$-5 \qquad -5$

$3a = 12$

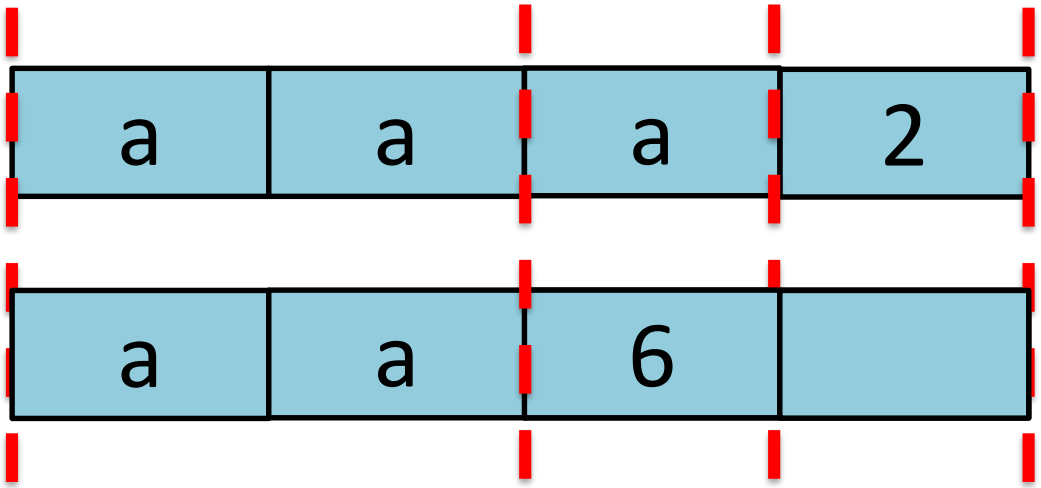
$\div 3 \qquad \div 3$

$a = 4$

Solving Equations

Solve… $3a + 2 = 2a + 8$

Model



Calculations

$$3a + 2 = 2a + 8$$

$-2a \qquad -2a$

$$a + 2 = 8$$

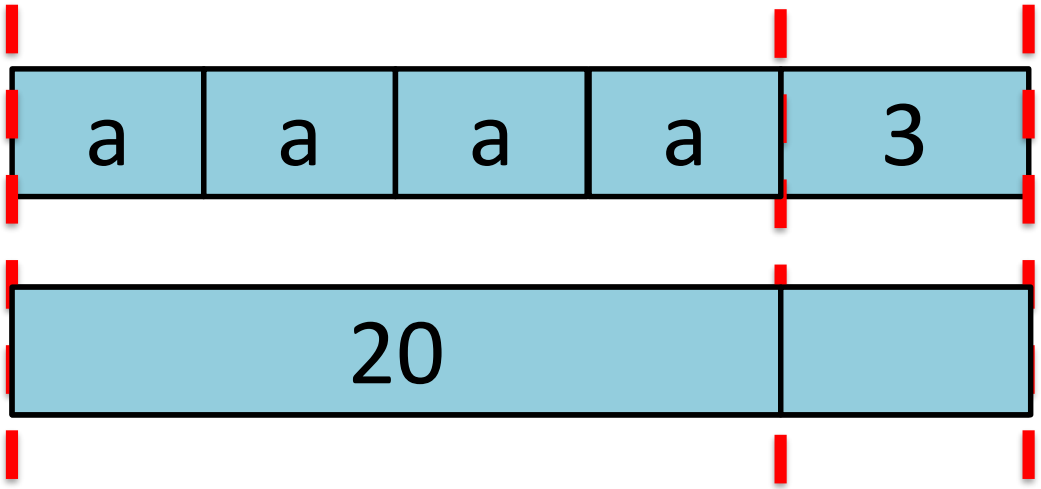
$-2 \qquad -2$

$$a = 6$$

Solving Equations

$4a + 3 = 23$

Model



Calculations

$4a + 3 = 23$

$-3 \qquad -3$

$4a = 20$

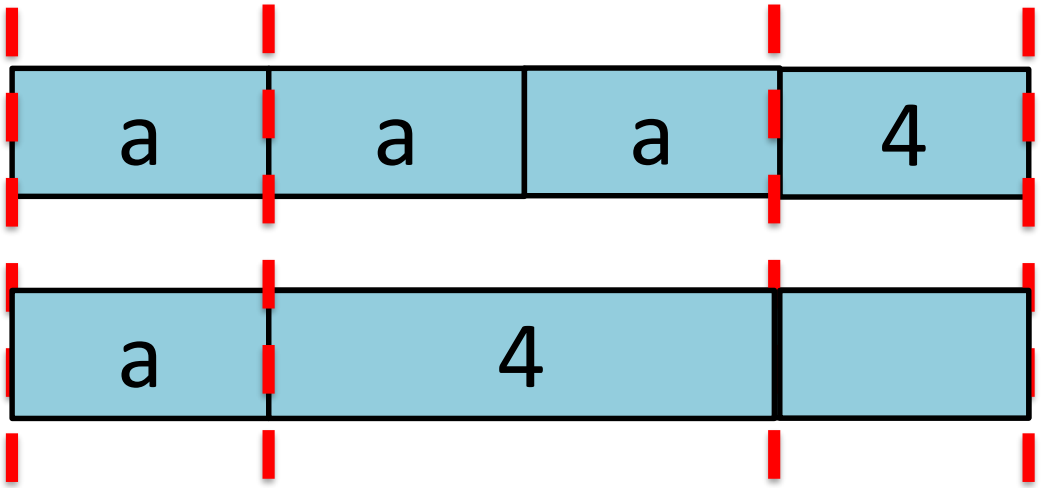
$\div 4 \qquad \div 4$

$a = 5$

Solving Equations

$3a + 4 = a + 8$

Model



Calculations

$$3a + 4 = a + 8$$

$-a \qquad -a$

$$2a + 4 = 8$$

$-4 \qquad -4$

$$2a = 4$$

$\div 2 \qquad \div 2$

$$a = 2$$

Solving Problems

Year 4

- Jenny had 42 stickers. She gave Paul 3/7 and Beth 2/6. How many stickers did they each have?

Year 4

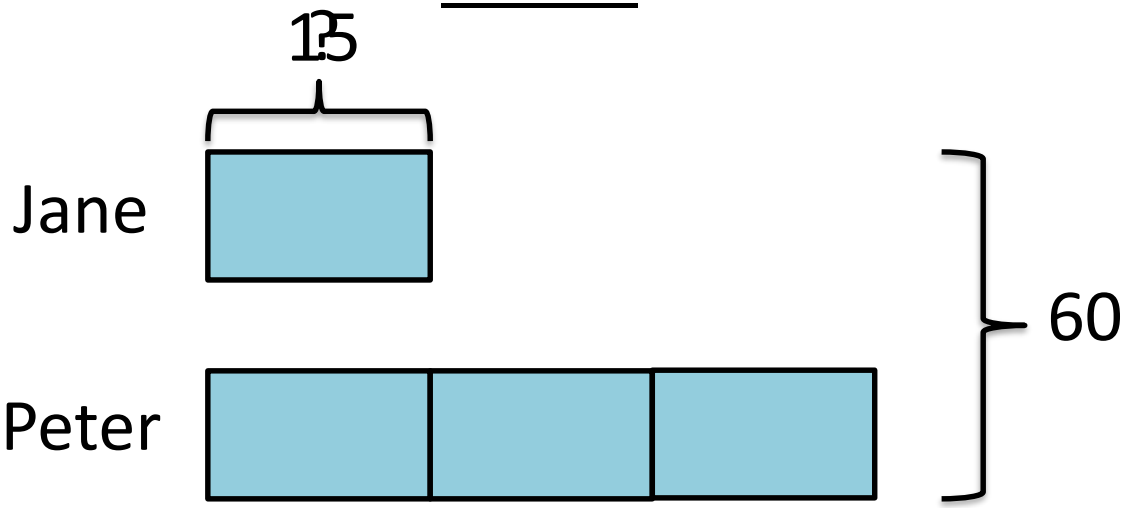
MathsHUBS White Rose

Problem 1

Peter and Jane have 60 sweets in total between them.

Peter has three times as many sweets as Jane. How many sweets does Jane have?

Model



Calculations

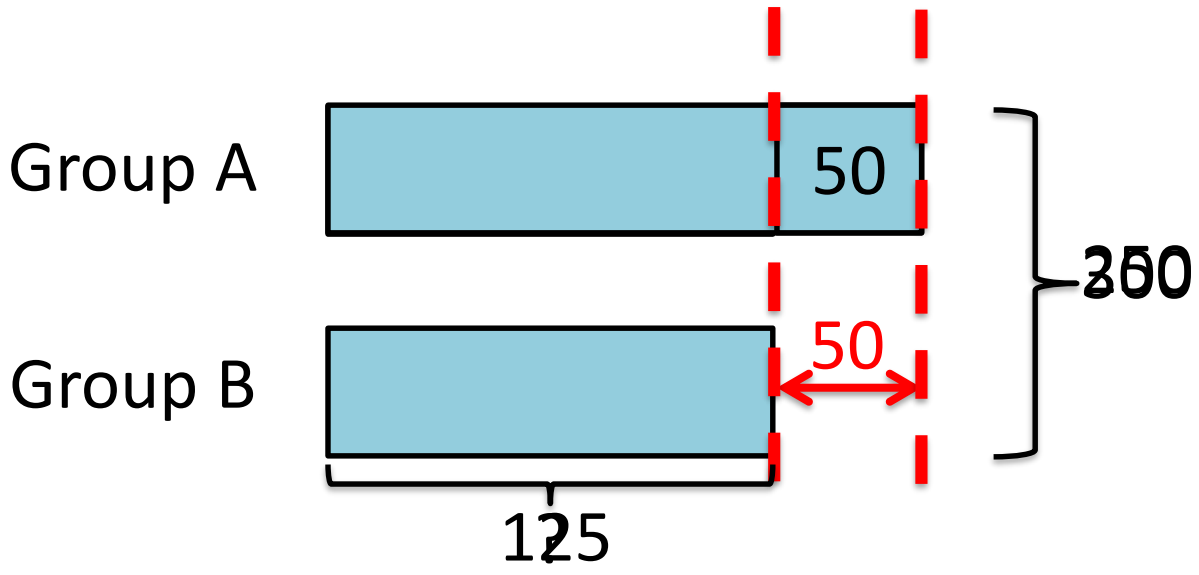
60 ÷ 4 = 15

Problem 2

300 children are divided into two groups. There are 50 more children in the first group than in the second group.

How many children are there in the second group?

Model



Calculations

300 - 50 = 250

250 ÷ 2 = 125

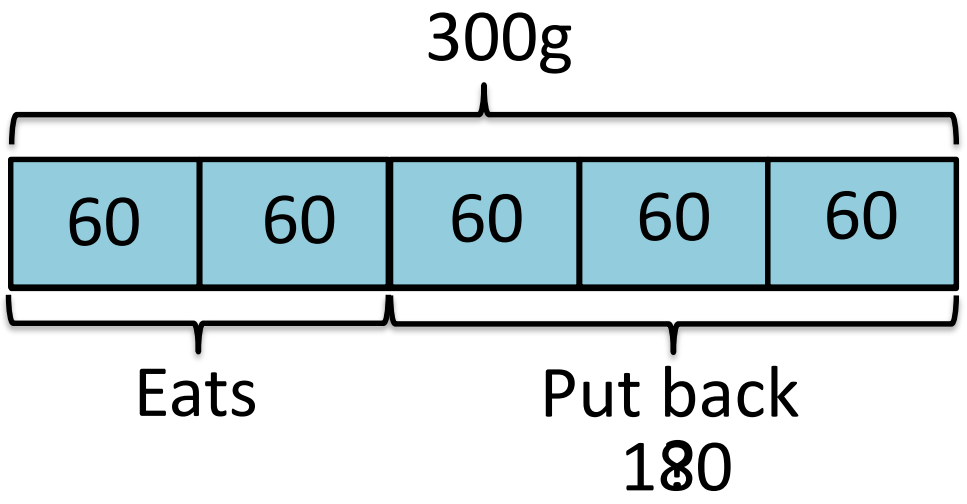
Primary Mathematics volume 4A

Problem 3

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



Calculations

300 ÷ 5 = 60

60 x 3 = 180

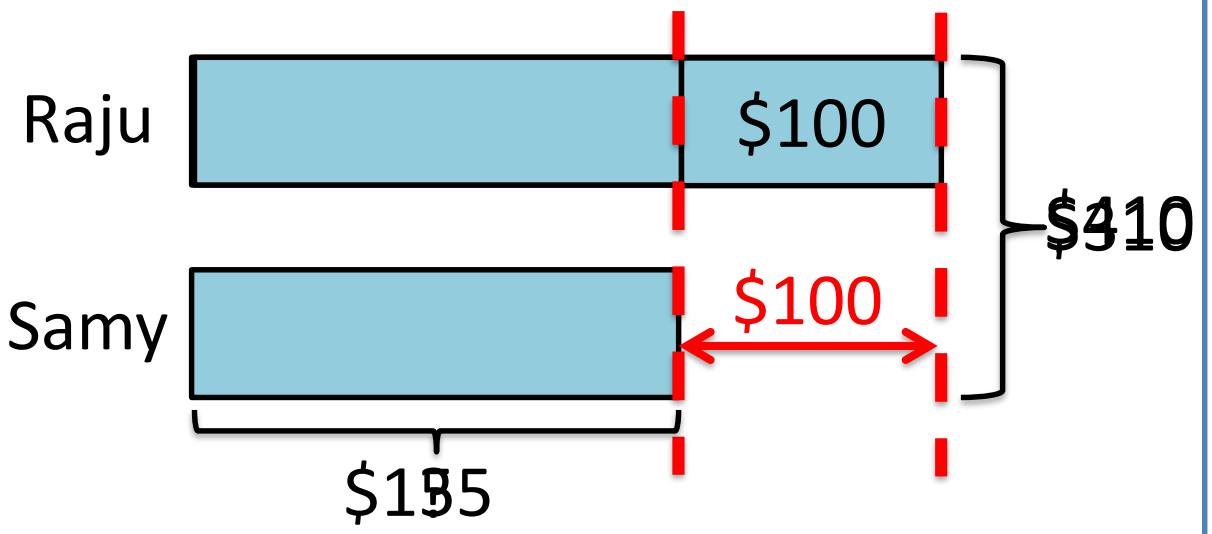
Now you try!

Please take the remaining time to work through some of the problems around the room and have a go at solving them if you wish! Please feel free to ask us any questions!

Problem 4

Raju and Samy shared $410 between them. Raju received $100 more than Samy. How much money did Samy receive?

Model



Calculations

410 - 100 = 310

310 ÷ 2 = 155

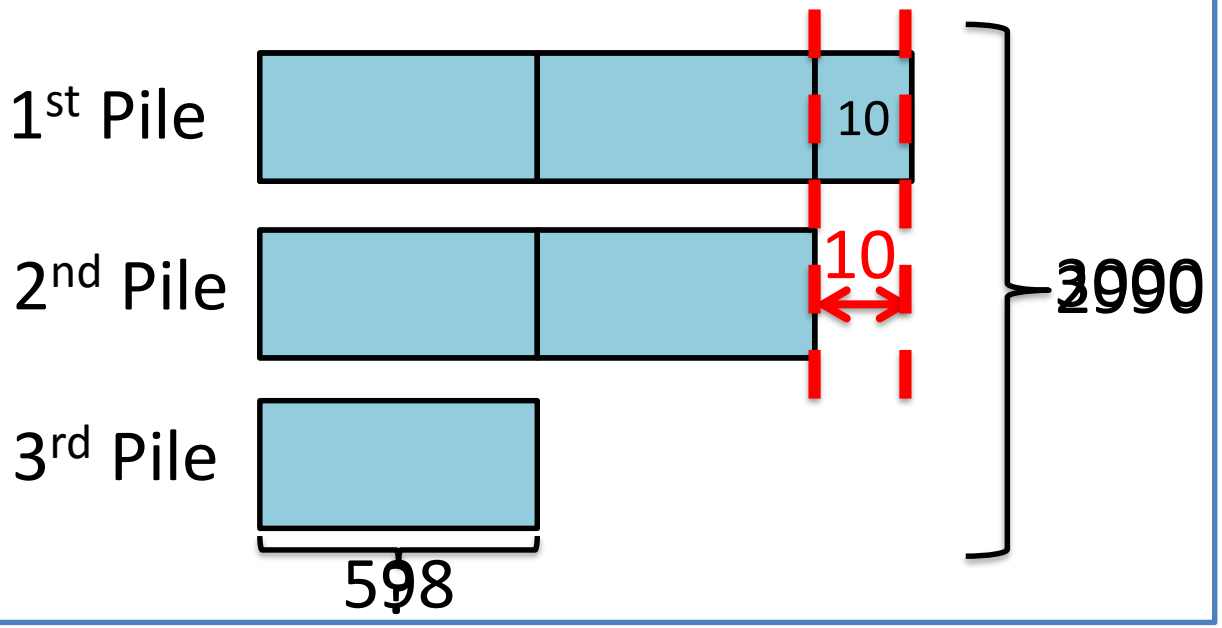
Primary Mathematics volume 5A

Problem 5

3000 exercise books are arranged into 3 piles. The first pile has 10 more books than the second pile. The number of books in the second pile is twice the number of books in the third pile.

How many books are in the third pile?

Model



Calculations

3000 - 10 = 2990

2990 ÷ 5 = 598

Primary Mathematics volume 4A

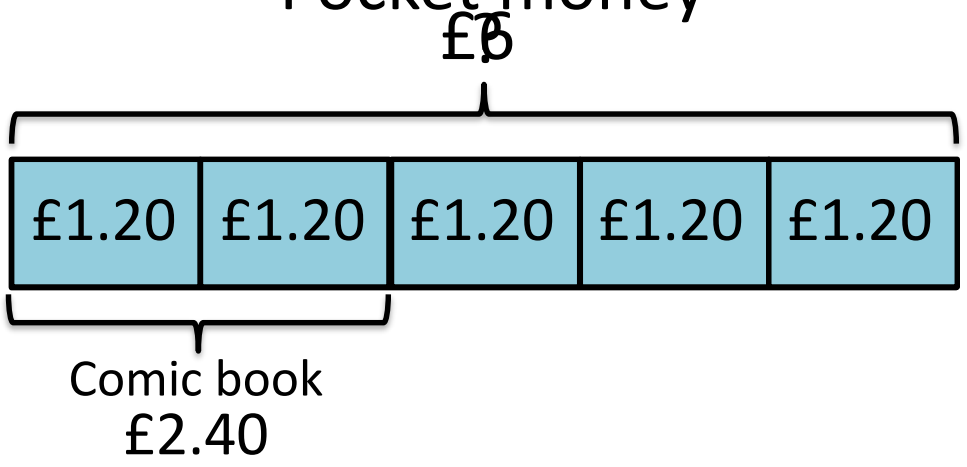
Problem 6

Jenny spent $\frac{2}{5}$ of her pocket money on a comic book.

The comic book costed £2.40

How much pocket money did Jenny get?

Model



Calculations

2.40 ÷ 2 = 1.20

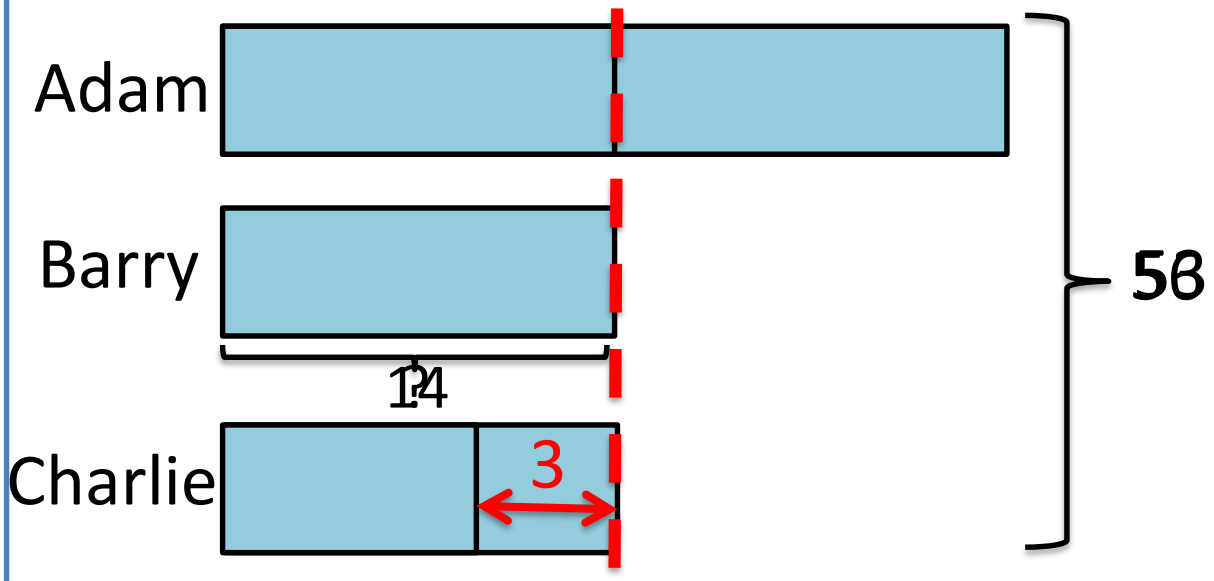
1.20 x 5 = 6

Problem 7

Adam is twice as old as Barry. Charlie is 3 years younger than Barry.
The sum of all their ages is 53.

How old is Barry?

Model



Calculations

53 + 3 = 56

56 ÷ 4 = 14

T. Staneff

Thank you

Karen and Hannah

Maths Leaders

Moorlands Primary School