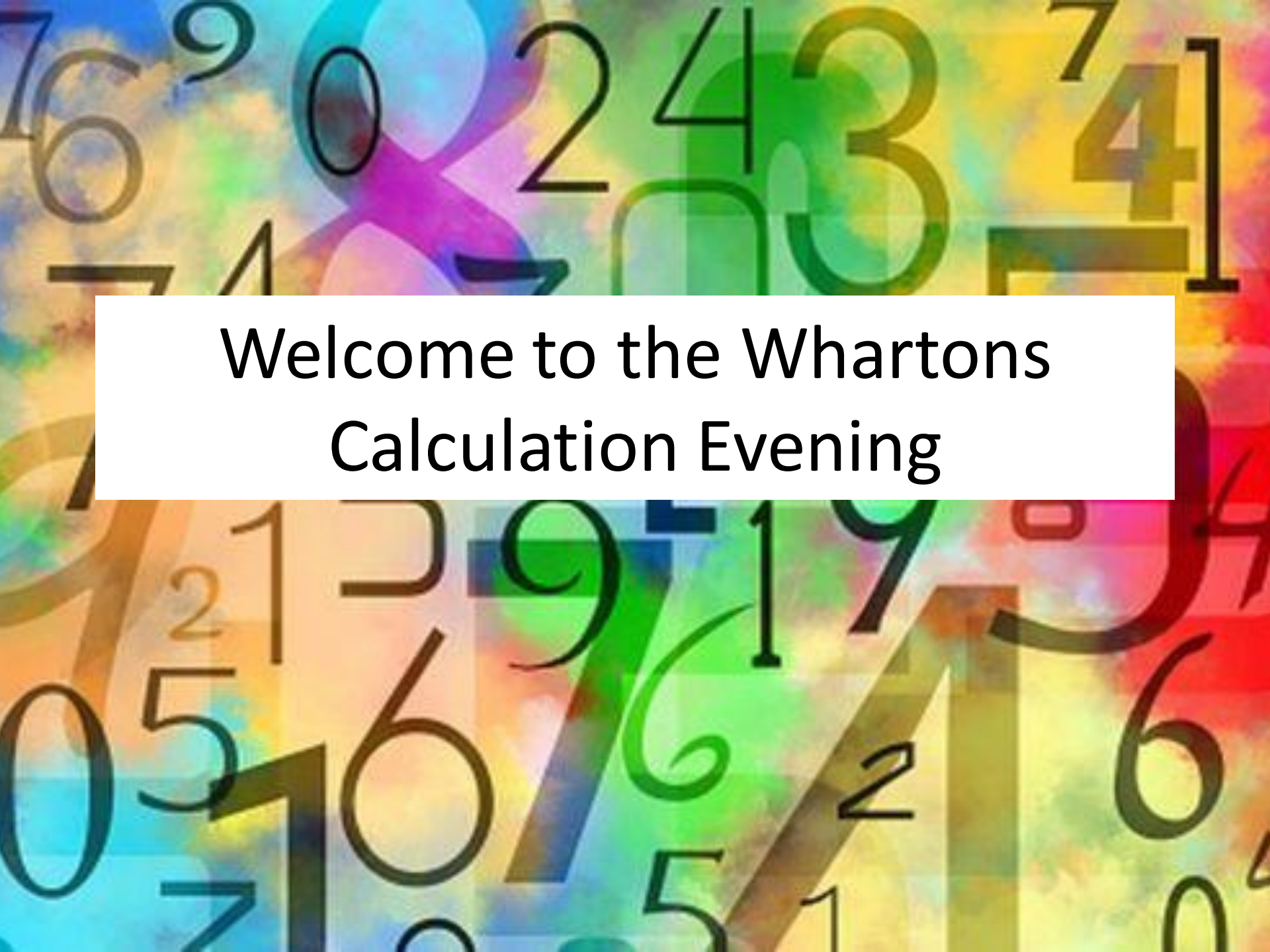
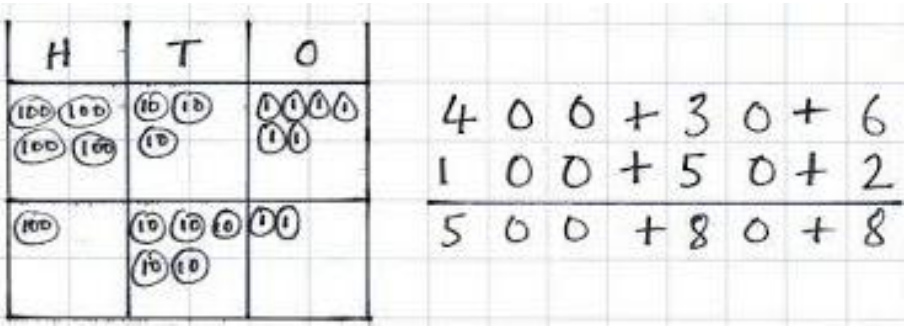

Welcome to the Whartons
Calculation Evening

Aims

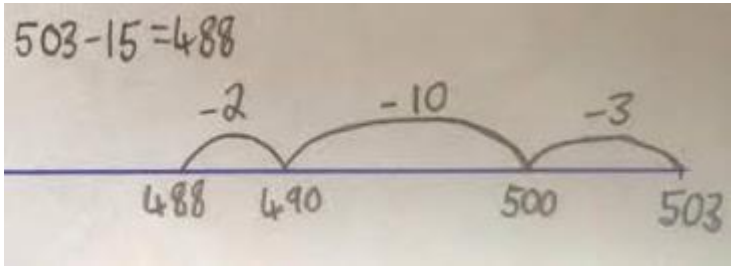
- Share the 3 stages of learning
- Four operations
- Bar Modelling
- How we can use models in other areas of mathematics
- Classroom – Teaching resources

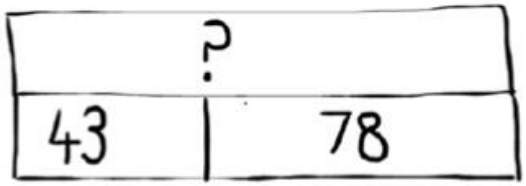
Stage 1 - Concrete

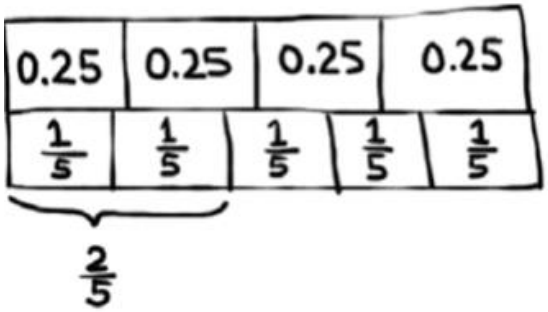
Stage 2 - Pictorial

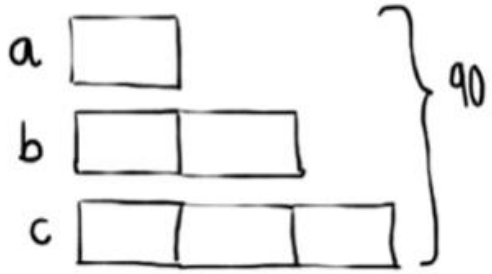


$$\begin{array}{r} 400+30+6 \\ 100+50+2 \\ \hline 500+80+8 \end{array}$$

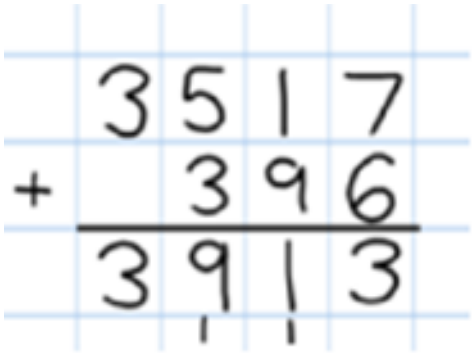


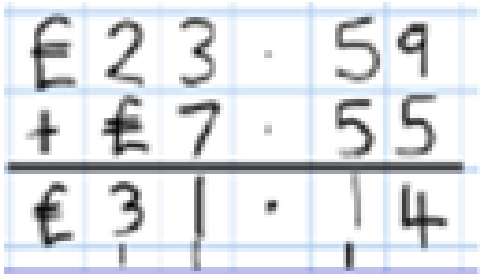


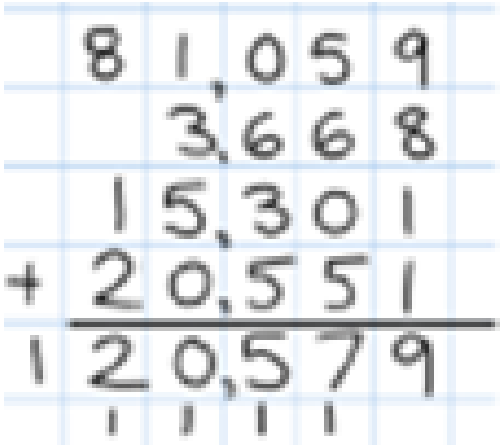




Stage 3 - Abstract







ADDITION

$$\begin{array}{rccc} & 7 & 8 & 9 \\ + & 6 & 4 & 2 \\ \hline 1 & 4 & 3 & 1 \\ \hline & 1 & 1 & \end{array}$$

SUBTRACTION

$$\begin{array}{rccc} & \cancel{8} & \cancel{1}\,\cancel{2} & 1_{2} \\ & \cancel{9} & \cancel{3} & 2 \\ - & 4 & 5 & 7 \\ \hline & 4 & 7 & 5 \\ \hline \end{array}$$

Short multiplication

24 × 6 becomes

	2	4
×		6
1	4	4
	2	

Answer: 144

342 × 7 becomes

	3	4	2
×			7
2	3	9	4
	2	1	

Answer: 2394

2741 × 6 becomes

	2	7	4	1
×				6
1	6	4	4	6
	4	2		

Answer: 16 446

Long multiplication

24 × 16 becomes

	2	
	2	4
×	1	6
2	4	0
1	4	4
3	8	4

Answer: 384

124 × 26 becomes

	1	2	
	1	2	4
×		2	6
2	4	8	0
	7	4	4
3	2	2	4
1	1		

Answer: 3224

124 × 26 becomes

	1	2	
	1	2	4
×		2	6
	7	4	4
2	4	8	0
3	2	2	4
1	1		

Answer: 3224

Short division

98 ÷ 7 becomes

$$\begin{array}{r} 1\ 4 \\ 7\overline{)\,9\ 8} \\ {\scriptstyle 2} \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 8\ 6\ \text{r}\ 2 \\ 5\overline{)\,4\ 3\ 2} \\ {\scriptstyle 3} \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 4\ 5\ \text{r}\ 1 \\ 1\ 1\overline{)\,4\ 9\ 6} \\ {\scriptstyle 5} \end{array}$$

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8\ \text{r}\ 12 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \quad 15\times 20 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \quad 15\times 8 \\ \hline 1\ 2 \end{array}$$

$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

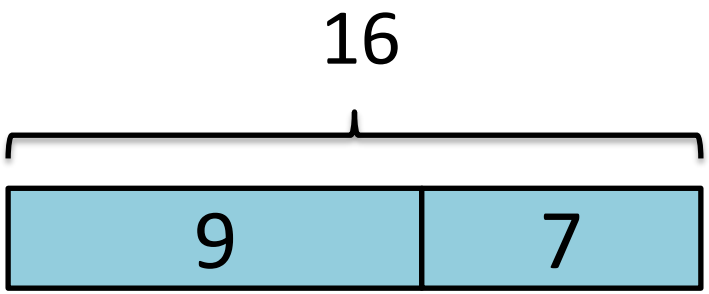
432 ÷ 15 becomes

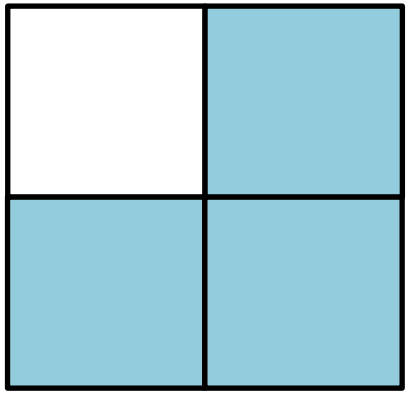
$$\begin{array}{r} 2\ 8 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ \downarrow \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \\ 1\ 2 \\ \hline \end{array}$$

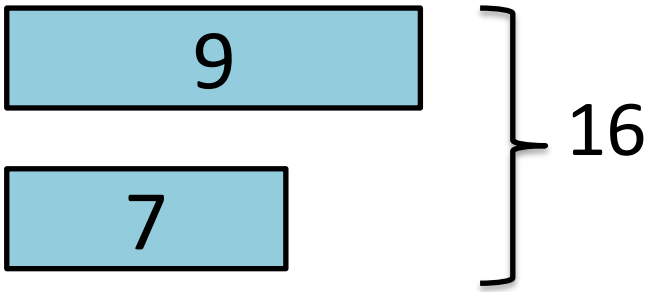
Answer: 28

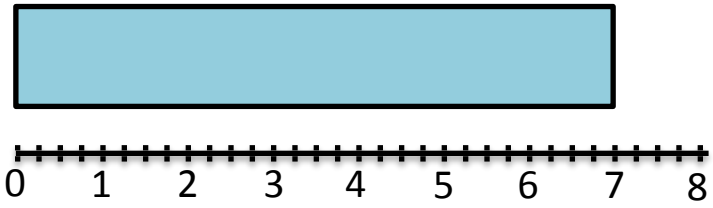

Bar Modelling

What Are Bar Models?

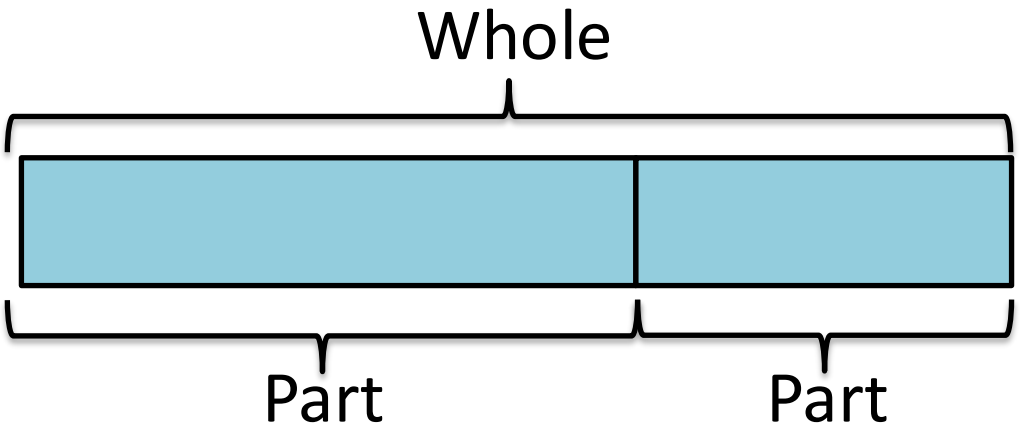








Terminology



part + part = whole

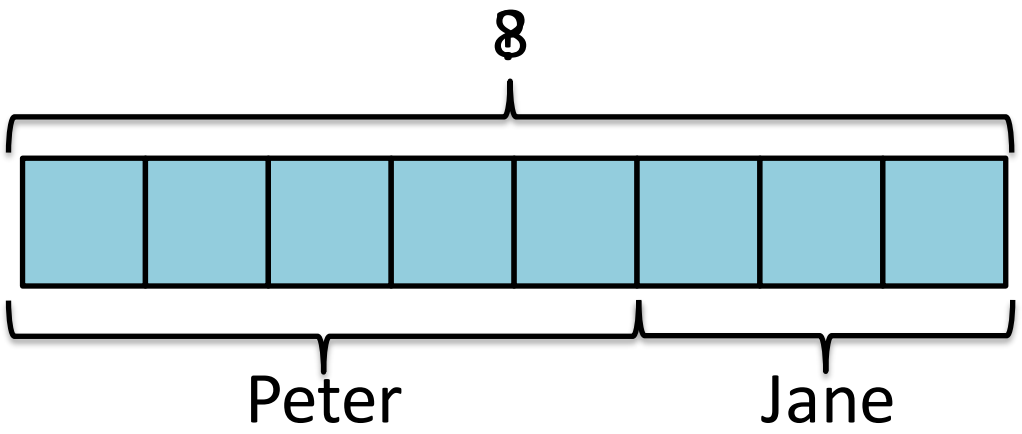
whole - part = part

Addition

Peter has 5 apples and Jane has 3 apples.

How many apples do they have altogether?

Model (Version 2)



Calculations

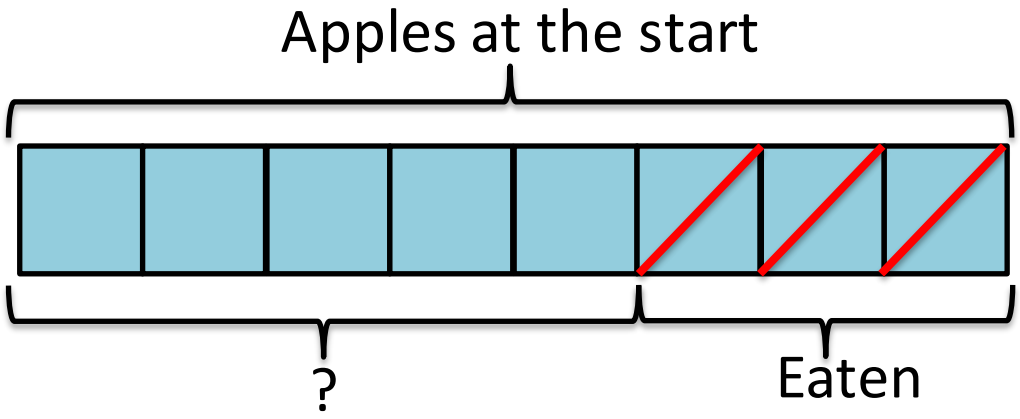
5 + 3 = 8

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

Subtraction

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

Model (Discrete)



Calculations

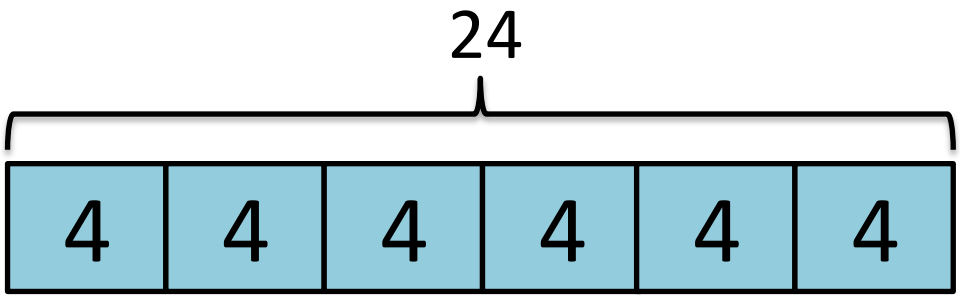
8 - 3 = ?

Multiplication

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

How many muffins does Peter buy all altogether?

Model



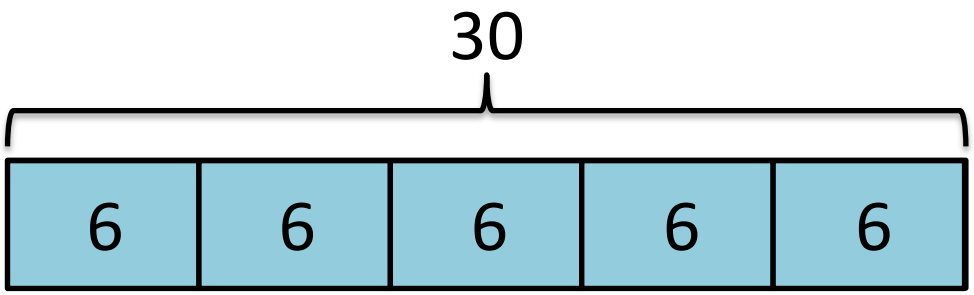
Calculations

$6 \times 4 = 24$

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

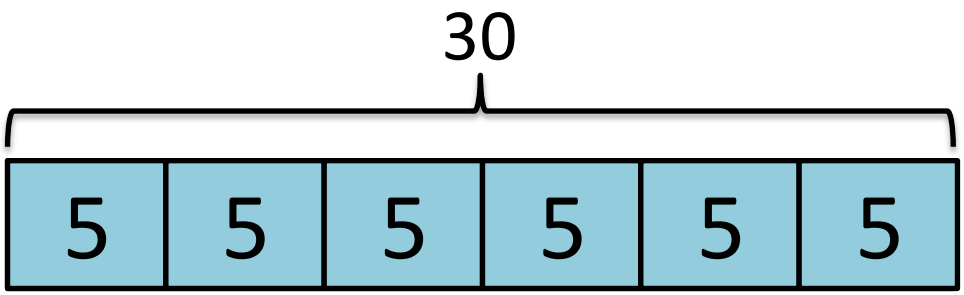
$30 \div 5 = 6$

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

$30 \div 5 = 6$

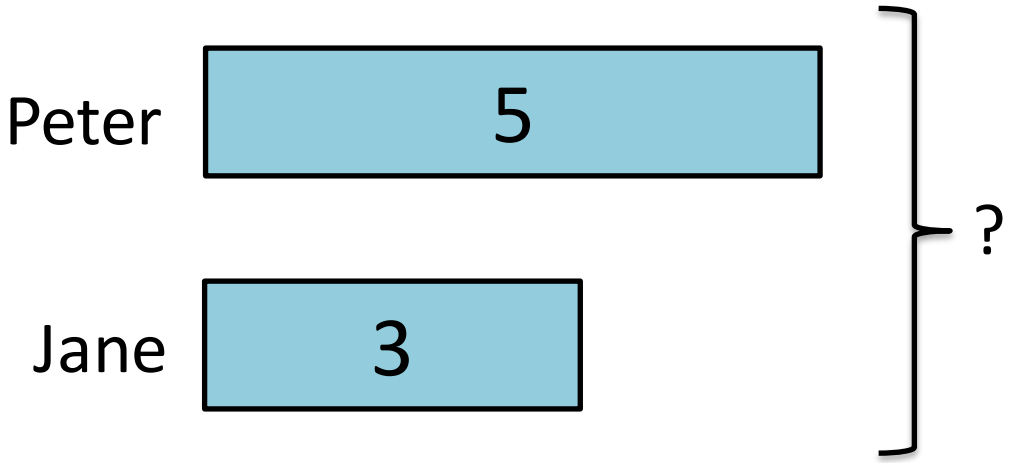
In this version, we are counting how many fives go into thirty.

Addition

Peter has 5 apples and Jane has 3 apples.

How many apples do they have altogether?

Model (Version 3)



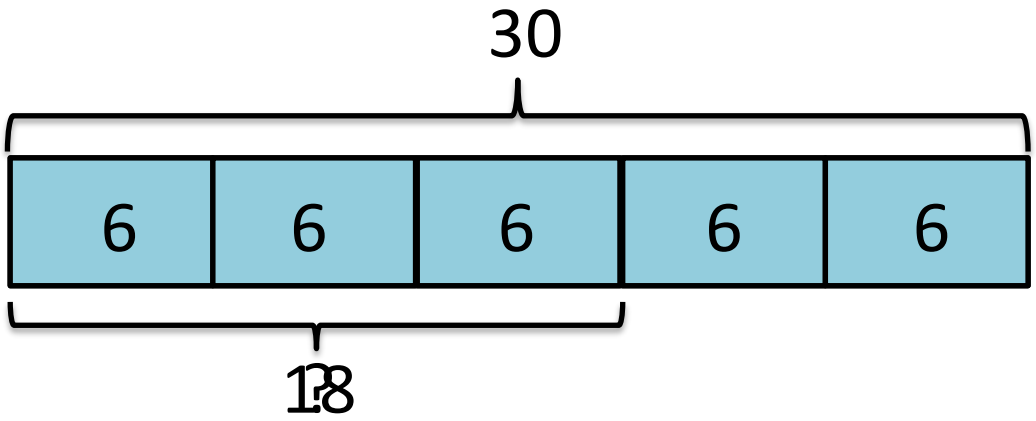
Calculations

5 + 3 = ?

Fraction of an Amount

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

Model



Calculations

$30 \div 5 = 6$

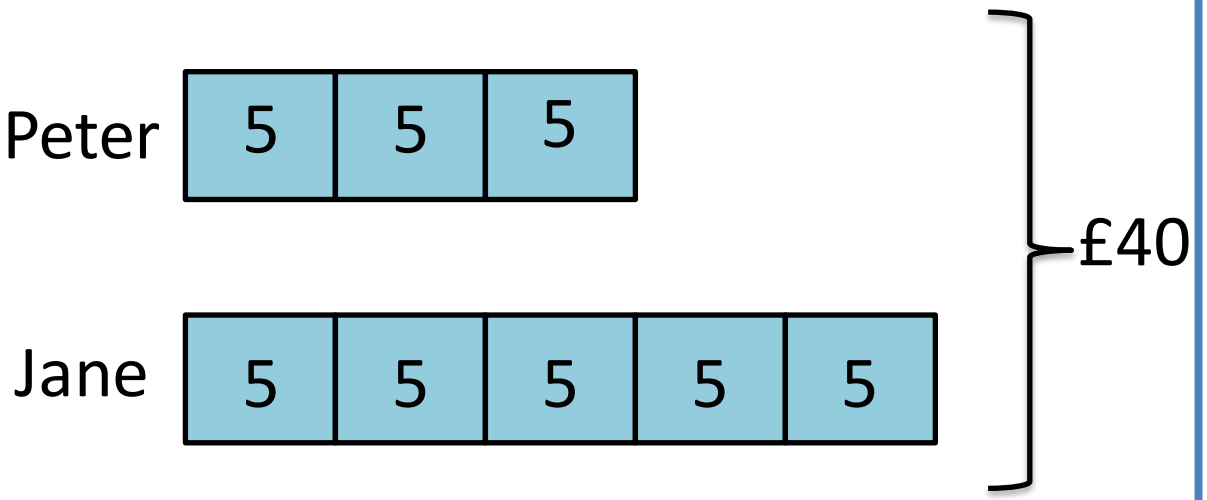
$3 \times 6 = 18$

Ratio

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

How much money does each person get?

Model



Calculations

40 ÷ 8 = 5

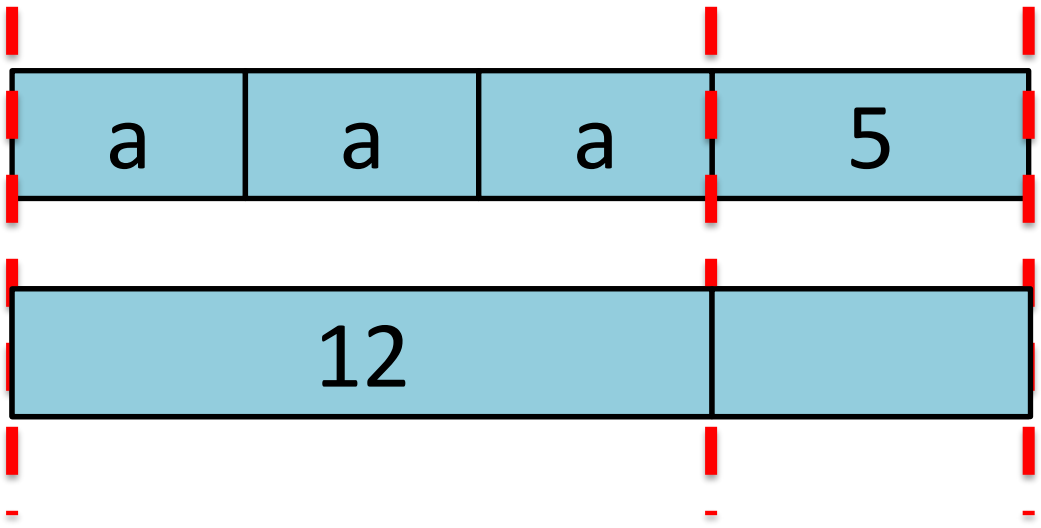
Peter: 3×5 = 15

Jane: 5×5 = 25

Solving Equations

Solve… $3a + 5 = 17$

Model



Calculations

$3a + 5 = 17$

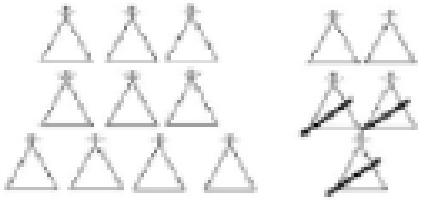
$-5 \qquad -5$

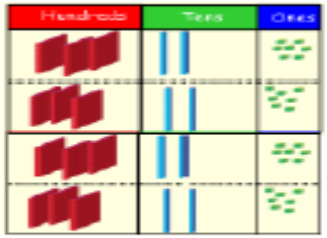
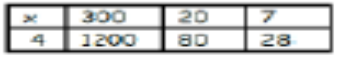
$3a = 12$

$\div 3 \qquad \div 3$

$a = 4$

Calculation Policy

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	Use physical objects, counters, cubes etc to show how objects can be taken away.  6—4 = 2 4—2 = 2	 15 – 3 = 12 Cross out drawn objects to show what has been taken away.	7—4 = 3 16—9 = 7

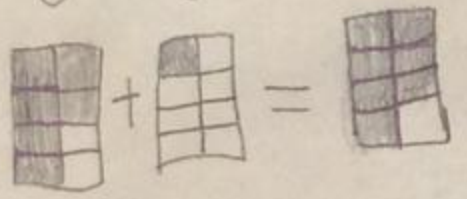
Objective & Strategy	Concrete	Pictorial	Abstract
Column Multiplication for 3 and 4 digits x 1 digit.	 It is important at this stage that they always multiply the ones first. Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642	 × | 300 | 20 | 7 4 | 1200 | 80 | 28	327 x 4 28 80 1200 1308 3 2 7 x 4 1 3 0 8 This will lead to a compact method.


Classrooms

How To Add + Subtract Fractions

How To Add

$\frac{6}{8} + \frac{1}{8} = \frac{7}{8}$



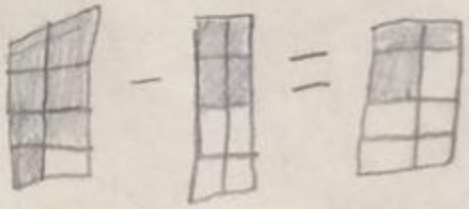
This is A diAGram OF Adding

Top Tips

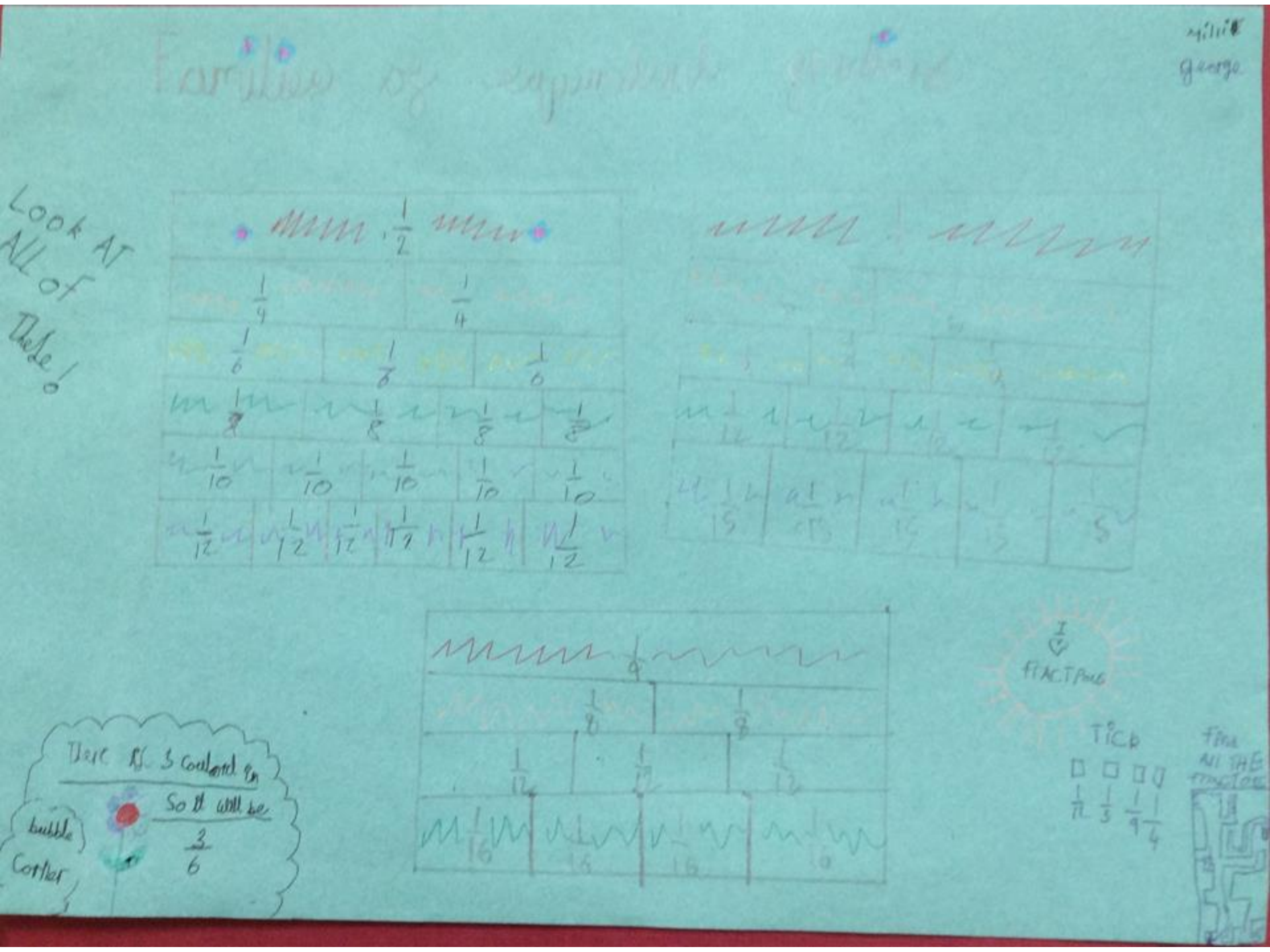
- Keep the denominater the SAme
- Add or take alwey the numerator

How To take alwey

$\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$



This is a diagram of Subtracting



millie
george
Look At All of These!
1/2
1/4 1/4
1/6 1/6 1/6
1/8 1/8 1/8 1/8
1/10 1/10 1/10 1/10 1/10
1/12 1/12 1/12 1/12 1/12 1/12
There is 3 coloured in
So it will be 3/6
bubble Corner
Tick

Finding Fractions of an amount

1. Divide the amount by the numerator.

$\frac{7}{8}$ of 56 → 56 ÷ 8 = 7 ($\frac{1}{8}$)

2. Times the answer by the numerator.

7 × 7 = 49 ($\frac{7}{8}$)

Billy G ♯ 2ak ♯

addition

- your should always have the same denominator.
- you should have a numerator and denominator

Subtraction

■ = 0 or nothing

Fractions

□ = nothing

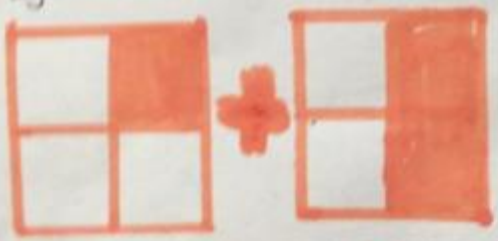
how do you add a fraction?

$\frac{1}{3} + \frac{1}{3} =$ Simply add the numerators

keep the same

$\frac{2}{10} + \frac{6}{10} = \frac{8}{10}$ or $\frac{4}{20} + \frac{12}{20} = \frac{16}{20}$

Eg:



$\frac{1}{4} + \frac{2}{4} =$

$\frac{3}{4}$ Numerator / denominator

How to - Fracions

you take the numerator away from the other numerator and your de

Eg:

$\frac{2}{8} - \frac{1}{8} = \frac{1}{8}$ or $\frac{4}{16} - \frac{2}{16} = \frac{2}{16}$

$\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$ or $\frac{8}{16} + \frac{2}{16} = \frac{10}{16}$

EXAMPLES

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{2}{4}$

$\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$ Numerator / Denominator

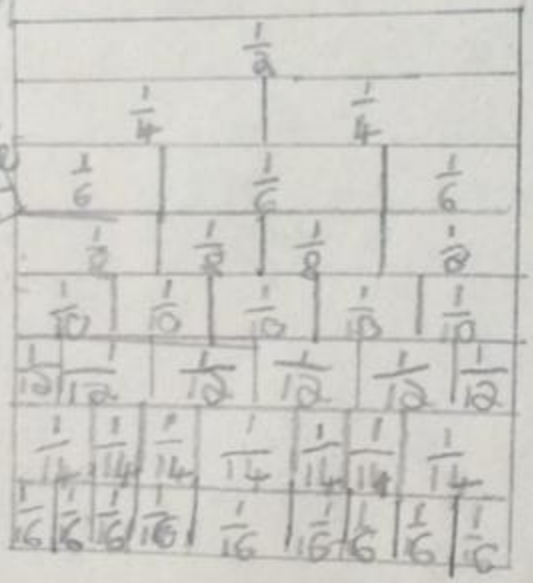
ADD + TAKE AWAY FRACTION

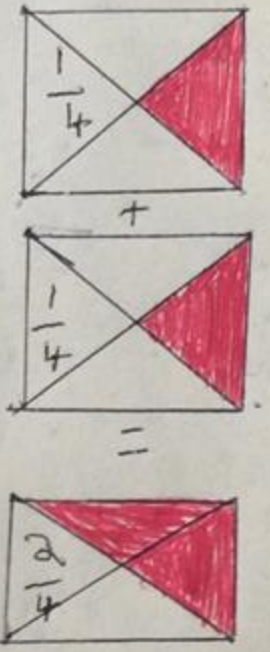
RULES!

1. The denominator stays the same

2. The numerator adds together

NOW YOU TRY






millions
hundred thousands
ten thousands
thousands
hundreds
tens
units
tenths
hundredths
Maths
Key Words
Three Types of Fraction:
proper fracti
improper fraction
numerator
denominator
equivalent
half
two fifths
convert
per cent (%)
percentage
What a Good One Looks Like
69 £


Any Questions?