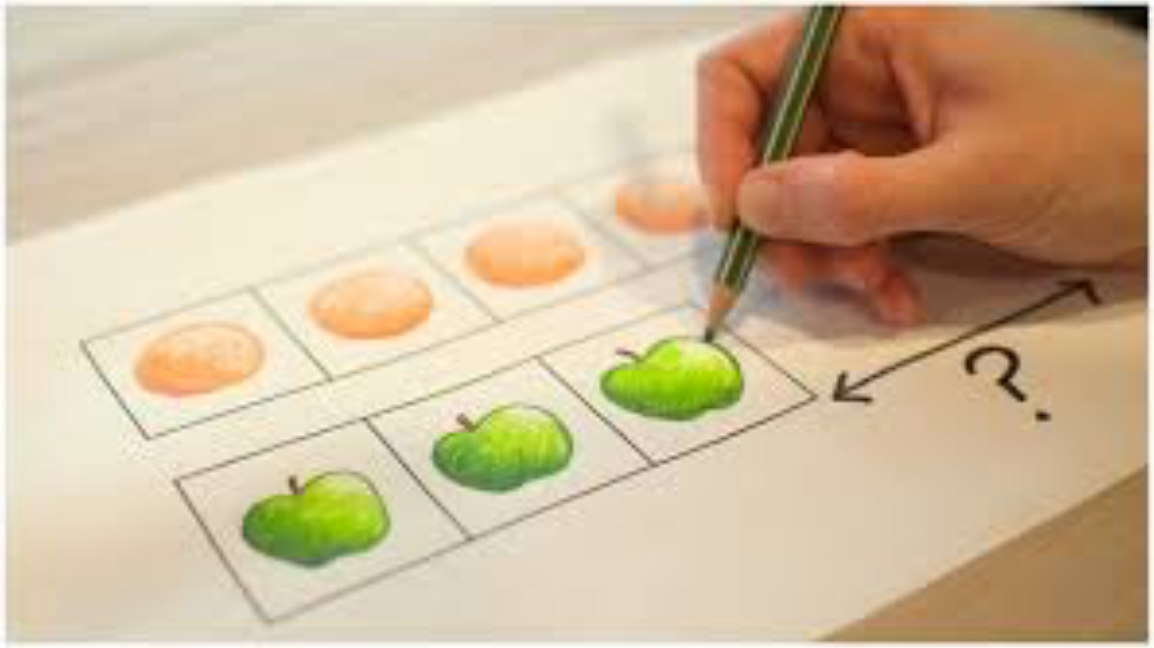
Mathematics Workshop



November 2015

Agenda

- Review key aims of new NC in Maths
- Reasoning
- Mastery
- Mathematics at Widewell
- Ways you can help your child

The New National Curriculum

Number

- Number and place value
- Addition and subtraction
- Multiplication and division
- Fractions (including decimals from Year 3, and percentages from Year 5)
- Ratio and proportion (from year 6)
- Algebra (from year 6)

Measurement

Geometry

- Properties of shapes
- Position and direction

Statistics (from year 2)

True or false?

- 2 + 3 = 3 + 2
- 6 x 7 = 7 x 6
- 20 ÷ 5 = 5 ÷ 20
- 30 X 9 = 9 x 30
- 5 – 4 = 4 – 5
- 23 + 25 = 22 + 26
- 4 x 12 = 8 x 6
- 68 – 27 = 59 – 18

Discuss with your neighbour the structures, relationships and connections you can see.

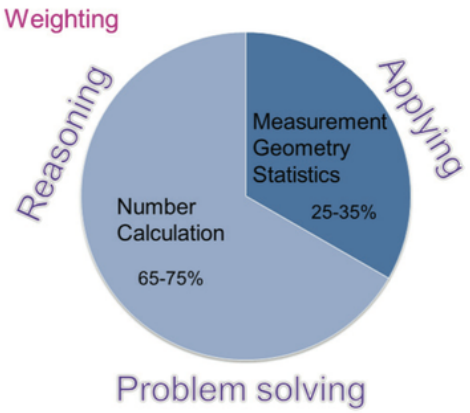
The National Curriculum 2014

"Just getting the right answer in maths class isn't enough if students don't know why the answer is the right one."

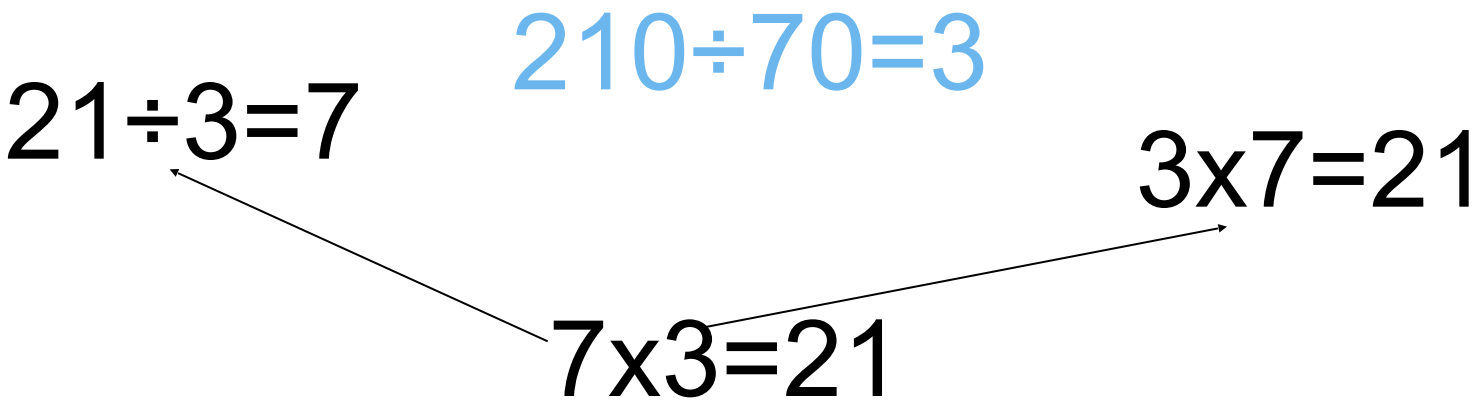
The National Curriculum is seeking to develop deep sustainable learning in line with successful countries.

National Curriculum Update

- Higher expectations overall
- Greater emphasis on number arithmetic
- Less data (statistics)
- New NC tests 2016 – arithmetic and reasoning paper
- NC Levels removed
- A mastery curriculum



What else do you know?



3x70=210

70x3 =210

21÷7=3

17 x 3 = 51

210÷3=70

What does reasoning mean?

What do you notice?

- 2, 4, 6, 8, 10, 12, 14, 16
- 2, 3, 5, 7, 11,13 (Can you give me more in this set?)
- $^{1}/_{2}$, $^{2}/_{4}$, $^{3}/_{6}$, $^{4}/_{8}$
- 4, 9, 16, 25, 36, …

Tesco – which is the best deal?

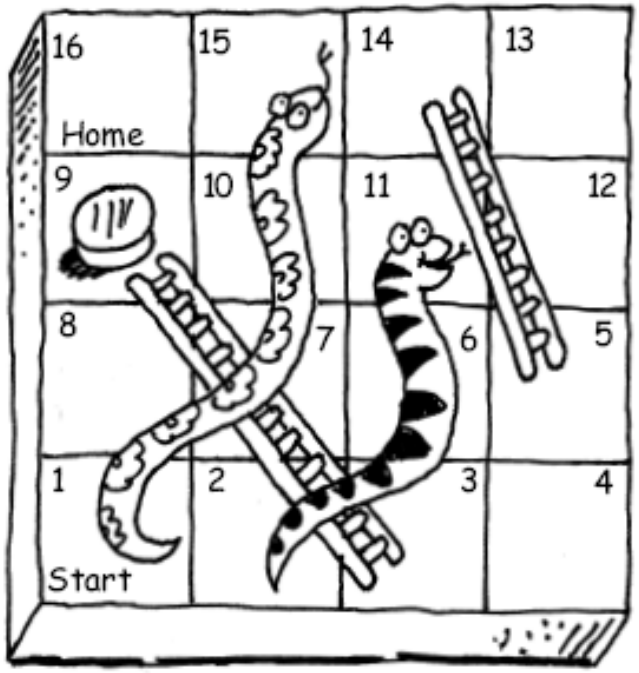
So, what is reasoning?

Some things reasoning can be seen as:

- **Thinking** about mathematics
- Making connections
- Application of facts and knowledge – either explicitly or implicitly
- Justifying
- Convincing yourself and others

Problem Solving

Snakes and ladders



My counter is on 9. After two moves, rolling an ordinary die with the numbers 1 to 6, I land on 16. What are all of the different ways I could have done it?

What skills are you using?

- Trial and Improvement
- Starting from the known
- Prior knowledge
- Reasoning
- Building on ideas
- Being systematic
- Looking for patterns

mastery

noun mas·tery \ˈmas-t(ə-)rē\

: knowledge and skill that allows you to do, use, or understand something very well

: complete control of something

What do we mean by mastery?

- If you drive a car, imagine the process you went through…
- The very first drive, lacking the knowledge of what to do to get moving
- The practice, gaining confidence that you are able to drive
- The driving test, fairly competent but maybe not fully confident
- A few years on, it's automatic, you don't have to think about how to change gears or use the brake
- Later still, you could teach someone else how to drive

However not all of us know exactly how the car actually works!

What does Mastery mean?

In mathematics, you know you've mastered something when you can apply it to a totally new problem in an unfamiliar situation.

Examples of Mastery Questions

Year 1

2 3 4 5 6

Use two of the digit cards to make a number greater than 50.
Use two of the digit cards to make a number less than 30.
Use two of the digit cards to make an odd/even number.
Use two of the digit cards to make a number between 47 and 59.
What is the smallest 2-digit number you can make?
What is the largest 2-digit number you can make?
Explain your reasoning.

Year 2

Amy thinks of a number.

Her number:

- is an even number
- is between 20 and 25
- has two different digits.

What is her number? Explain your reasoning.

Year 3

Captain Conjecture says, ‘If you add 6 to a number ending in 7 you will always get a number ending in 3.’ Is he correct?

Explain your answer.

Year 4

Here is a sequence of numbers: 20, 30, 40, 50

What will the nineteenth number in the sequence be?

What will the hundredth number in the sequence be?

Year 5

The temperature at 6 a.m. was recorded each day for one week.

Mon	Tues	Wed	Thur	Fri	Sat	Sun
1°c	-1°c	0°c	3°c	2°c	-2°c	-3°c

What is the difference in temperature between the coldest day and the warmest day?

At what time of year do you think these temperatures were recorded? Do you think it might have snowed during the week?

Explain your reasoning.

Year 6

Mrs Holder has four cards. On each card is a number:

59 996	59 943	60 026	62 312

She gives one card to each pupil. The pupils look at their card and say a clue.

Sarah says, ‘My number is 60 000 to the nearest 10 thousand.’
Chris says, ‘My number has exactly 600 hundreds in it.’
Charis says, ‘My number is 59900 to the nearest hundred.’

David says, ‘My number is 60 000 to the nearest 10.’
Can you work out which card each pupil had? Explain your choices.

Our national curriculum – what's new?

"The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace."

"Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content."

- Instead of accelerating, we believe in developing a depth of understanding for pupils of all abilities, which requires teaching fewer topics but in much greater detail.
- Rather than accelerating high attaining students through topics, they are challenged to delve deeper into it and solve problems with very little structure.

MASTERY APPROACH

SHANGHAI OR SINGAPORE?

Laura saved money from her job. She then spent 5/8 of it on a special Present for her mum. How much money did she have left?

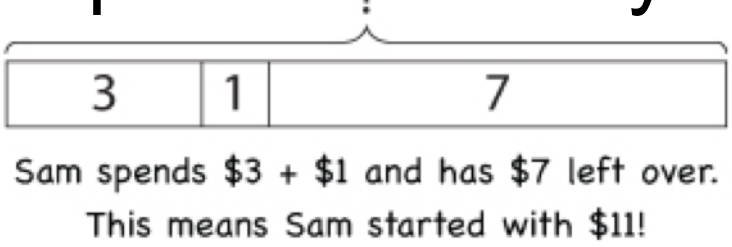
Laura's money

£240 ÷ 8 = £30

3 x £30 = £90

What is the Singapore bar method?

- A “thinking tool” that allows students to visually represent a mathematical problem and transform the words into an appropriate numerical operation
- A tool that spans different years/levels



Singapore Bar Model Method

Alice earned money from tips from her waitress job.

She put ¼ of the money in her savings account. She gave ¾ of the remaining money to the local food bank. She had £12 left for herself.

How much money did Alice earn in tips?

Read the entire problem and underline the question.

Alice earned money from tips from her waitress job. She put ¼ of the money in her savings account. She gave ¾ of the remaining money to the local food bank. She had £12 left for herself.

How much money did Alice earn in tips?

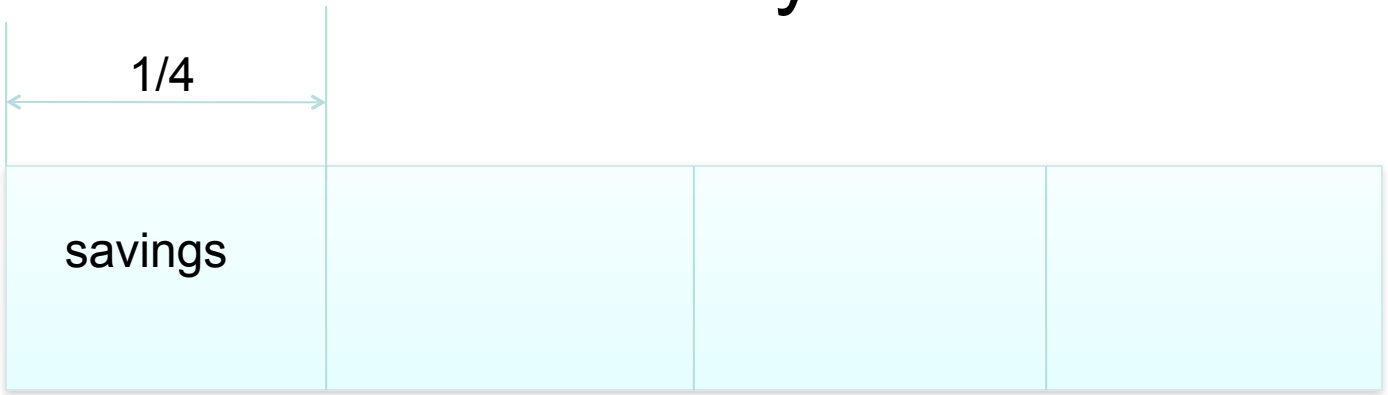
Draw a Bar(s)

Alice's Tips

“Chunk” the Problem

Draw in information that you know

Alice’s Tips



“Chunking”…

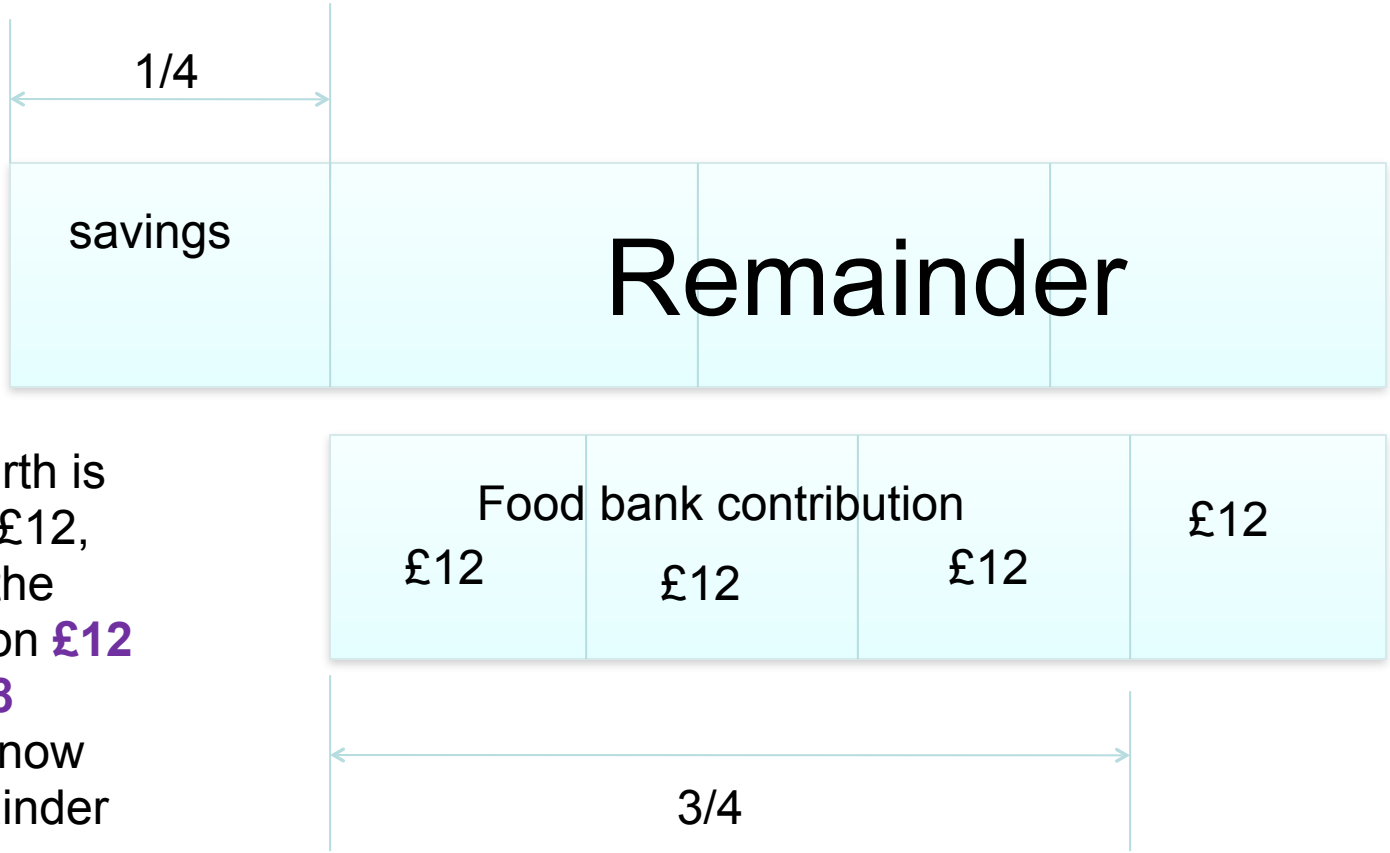
Continue to fill in information that you know.

Alice’s Tips

Can you see what each fourth is equal to in the bottom bar?

Perform Calculations

Alice's Tips



Each fourth is equal to £12, We use the calculation **£12 x 4 = £48**
So, we know the remainder was £48.

Perform Calculations

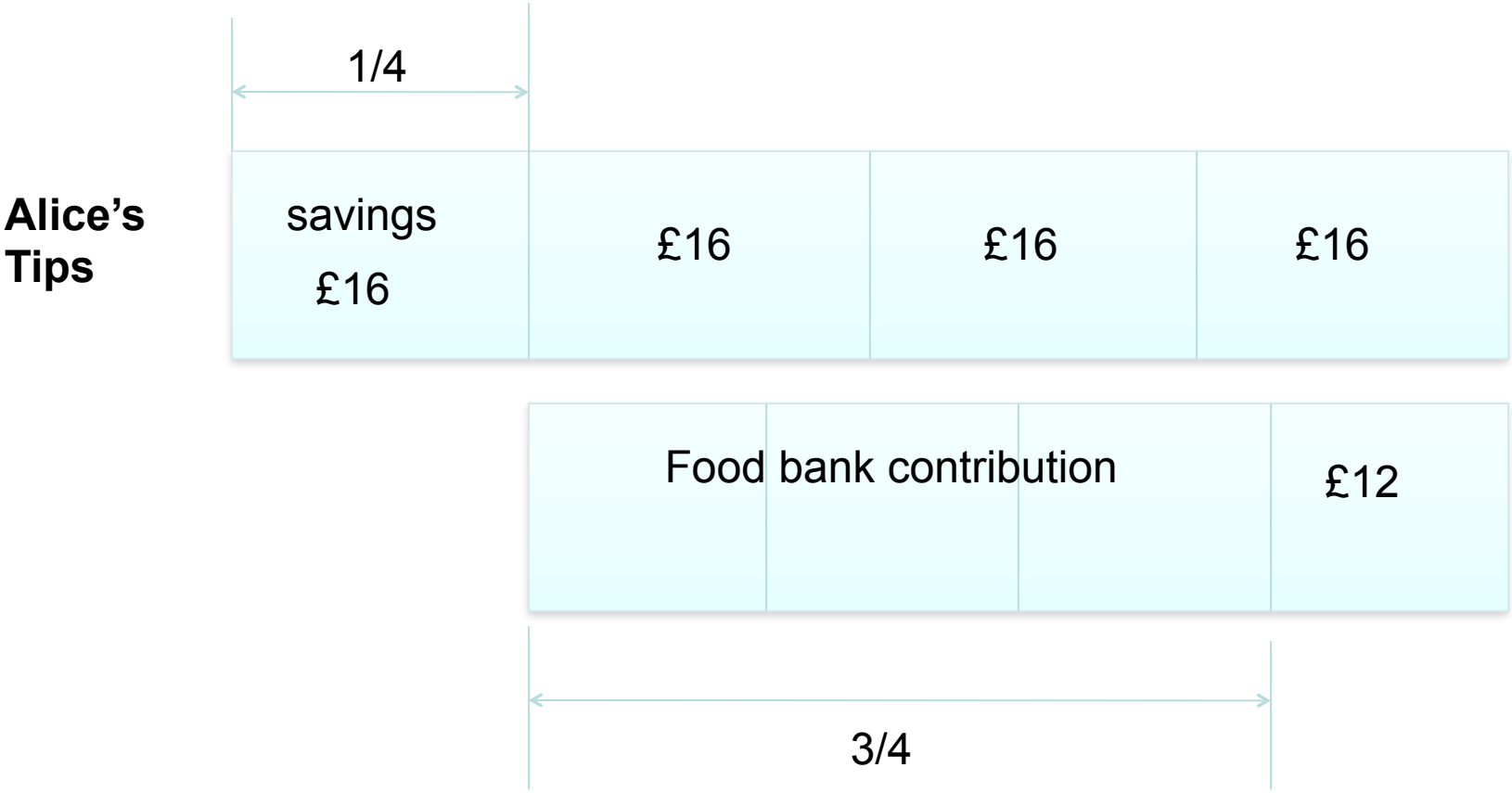
On the top bar, the Remainder is divided into thirds.
£48 / 3 = £16

Conclusion

We see that each fourth on the top bar is equal to £16. So, the total tips that Alice earned were £16 x 4 = £64

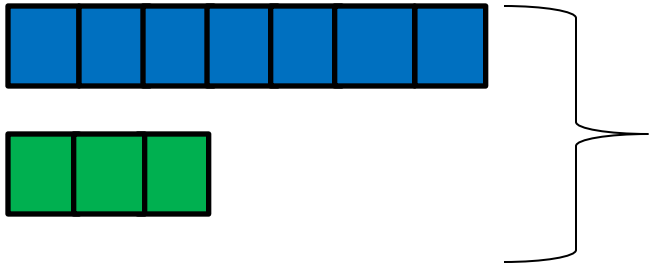
Conclusion

Alice earned £64 in tips.



Begin with the basics…

Concrete



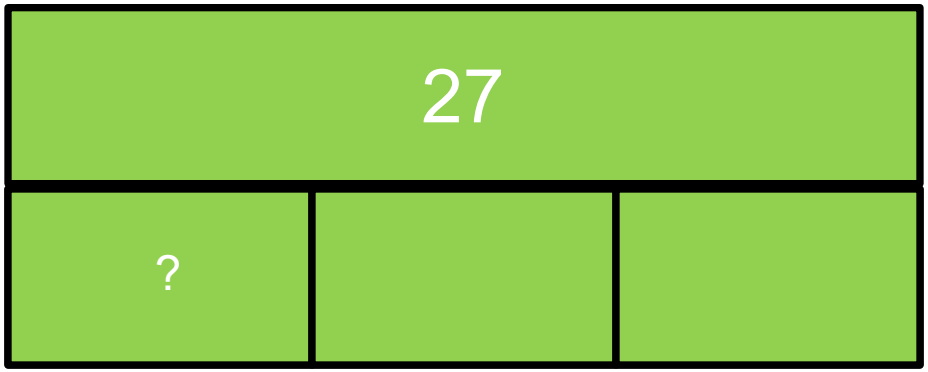
Pictorial

7 + 3 =

Abstract

There were 27 desks to clean. 3 boys shared the work equally. How many desks did each boy clean?

Desks



3 units = 27

$27 \div 3 = 9$

1 units = 9

Each boy cleaned 9 desks.

12 Apples cost **10p** each. Pears cost **25p** each.

Amy buys **1 apple** and **2 pears**.

How much **change** does she get from **£1**?

Show your working

p

KS1 Sample Questions

NC Tests 2016

5 $\frac{3}{4}$ of 20 = ☐

Qu	Requirement	Mark	Additional guidance
5	15	1m	

Arithmetic KS1 Sample Questions

NC Tests 2016

Bar Modelling

- They are specifically used to help pupils make sense of word problems.
- The approach is designed to reveal the structure of the mathematics. It is not a tool for performing a calculation.
- This approach is used to solve increasingly complex problems.

Year Group	+	-	x	÷
1	45 + 7	14 – 6	Double 16	Half of 26
2	37 + 45	45 - 23	7 x 5	35 ÷ 5
3	278 + 486	384 - 156	27 x 6	73 ÷ 3
4	4546 + 3423	4634 - 1283	323 x 8	297 ÷ 4
5	4567.23+5432.43	44567 – 12893	1256 x 24	5222 ÷ 7
6	1324.9 + 87.256	324.9 - 47.25	326.7 x 3	8398 ÷ 27

Mathematics at Widewell

Abacus Maths
- Visual
- Purple pens of power
- Teacher feedback
- Mastery Questions
- DIRT on a Friday

How can I support my child with maths?

- Playing games
- Solving problems together
- Homework
- Learning number bonds
- Learning times tables
- Useful websites
- School website