How we teach Maths at WTW

Why the workshop? Why Maths Mastery?

How many **degrees** does Layla turn through in her dive?

°

1 mark

Vs

How many degrees are there in a full turn?

How many degrees in one and a half turns?

Strategies for teaching maths have changed since many of us were at school. Previous approaches to teaching maths often did not support a secure, deep understanding of maths.

Key principles of a maths mastery approach

The expectation is that the **majority of pupils will move through the programmes of study at broadly the same pace**. Children who find a concept difficult to be given additional support (aim to 'keep up' rather than 'catch up')

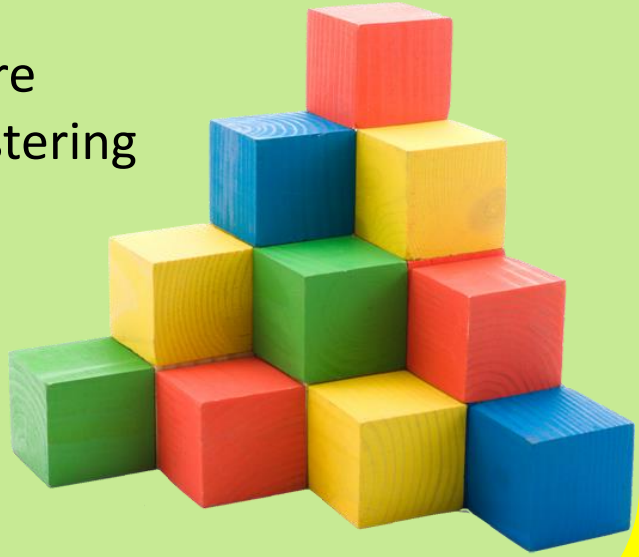
Pupils who grasp concepts rapidly should be **challenged through being offered rich and sophisticated problems** before any acceleration through new content.

Key principles of a maths mastery approach

Depth not acceleration…

The old curriculum, measured in terms of levels, encouraged undue pace. Children were accelerated onto more complex concepts before really mastering earlier ones.

The new curriculum encourages a study of fewer skills in greater depth – mastery.



Key principles of a maths mastery approach

Puts numbers first

White Rose Maths Mastery has number at its heart - confidence with numbers is the first step to competency in the curriculum as a whole.

Year 1 White Rose scheme of learning

Key principles of a maths mastery approach

Vocabulary

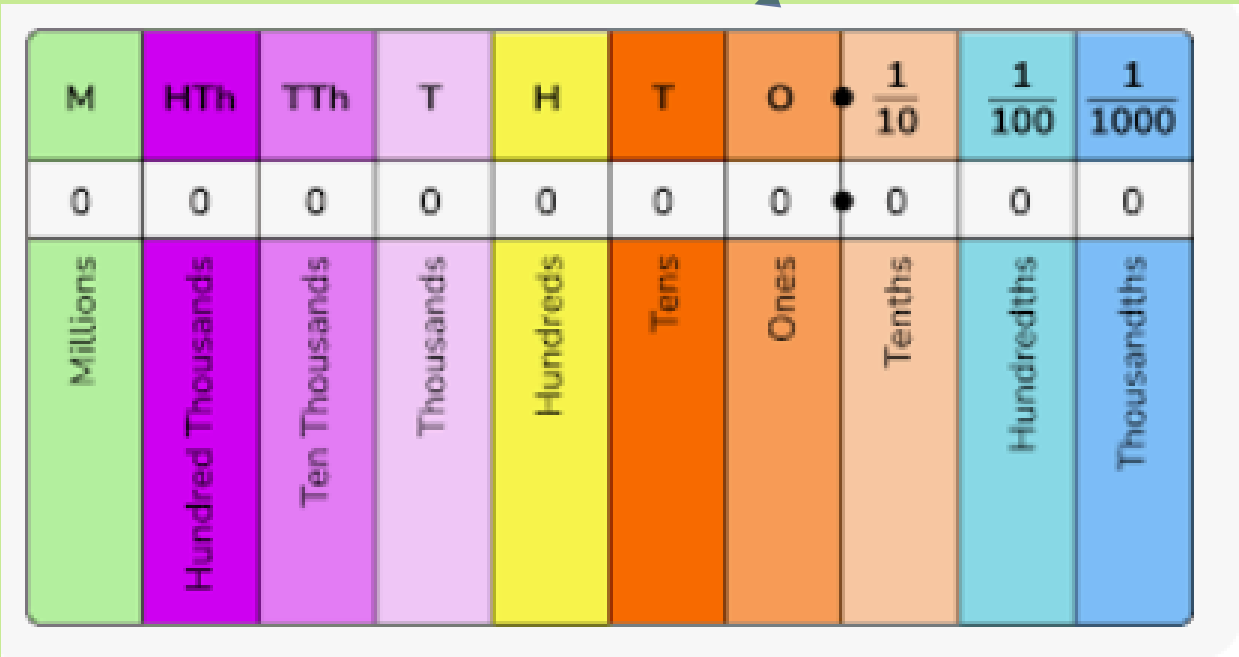
Using the correct maths vocabulary is an essential part of every lesson, and it underpins our mastery approach. When children are using mathematical talk to explain their answers, thinking or reasoning, it demonstrates whether or not they have fully understood, or 'mastered' the learning intention.

Understanding maths vocabulary can help children to instantaneously use the correct mathematical operations needed to solve their 'apply' and 'think' questions.

PLACE VALUE

Ones not Units

Digits vs Number



M	HTh	TTh	T	H	T	O	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0	0	0	0	0	0	0	0	0	0
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

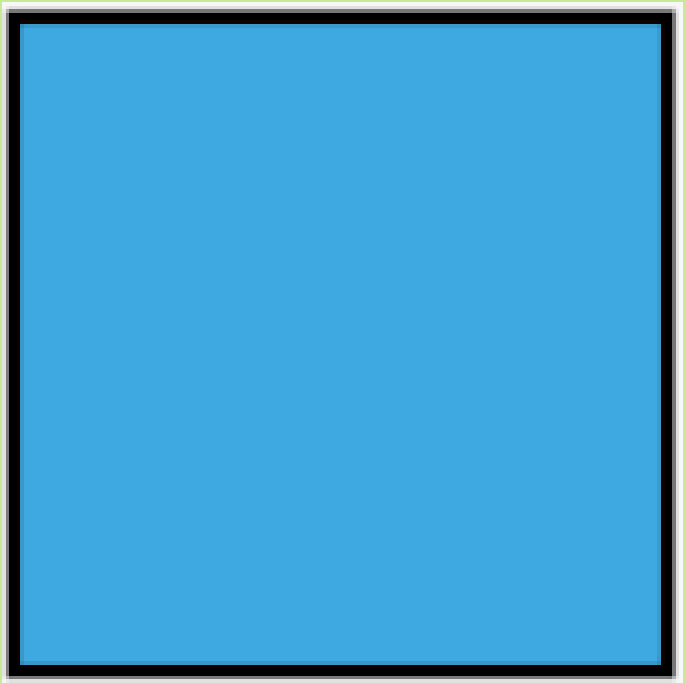
What is the difference between a digit, a number and an integer?

A **digit** is a single number

A **number** is the combination of digits

An **integer** is a whole number (without any decimals)

What is the name of this shape?



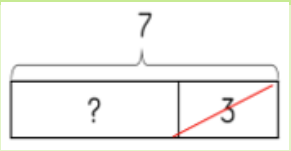
Activity

OTHER VOCABULARY…

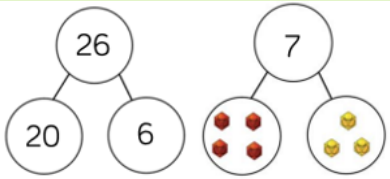
- Lowest Common Multiple
- Highest Common Factor
- Intervals
- Ascending/descending
- Composite number
- Square number
- cube number
- Proper fraction
- Translation
- Placeholder
- Exchange
- Numerator
- Denominator
- common denominator
- Compound shape

To name just a few!

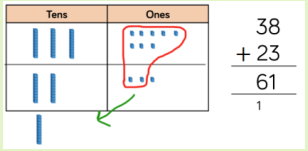
Bar model



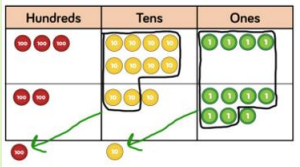
Part-whole model



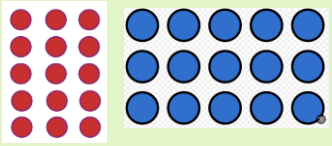
Base 10



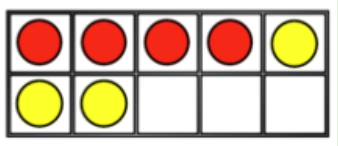
Place value chart



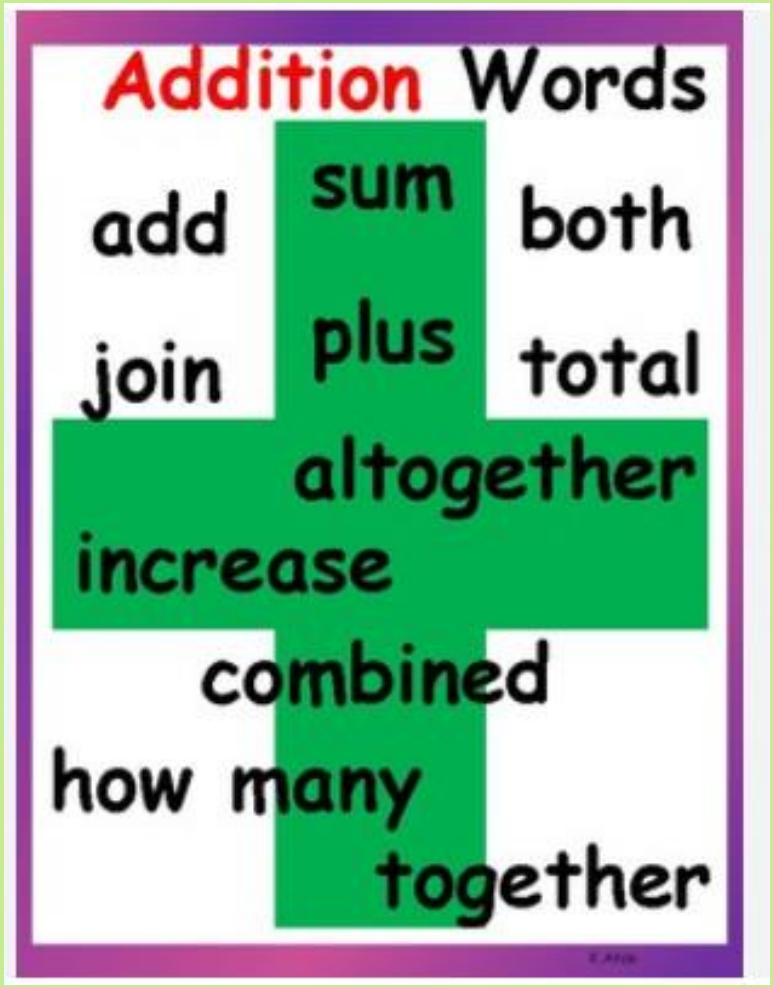
Arrays



10 frame



Rekenrek



ADDITION

Write five coins that have a total of 37p.

p	p	p	p	p

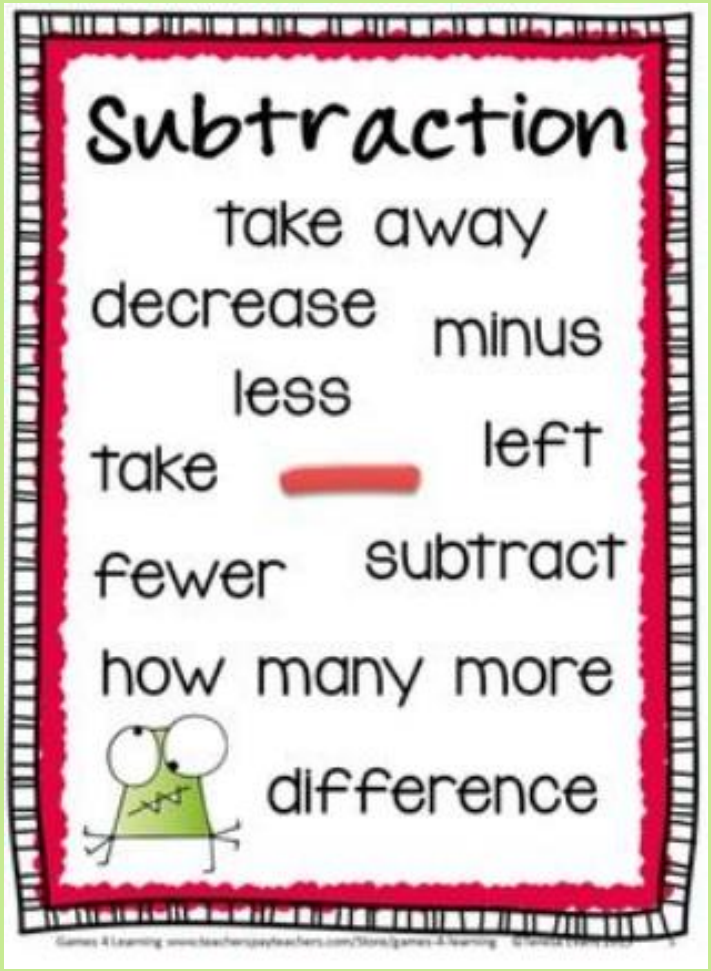
A shop has an offer.

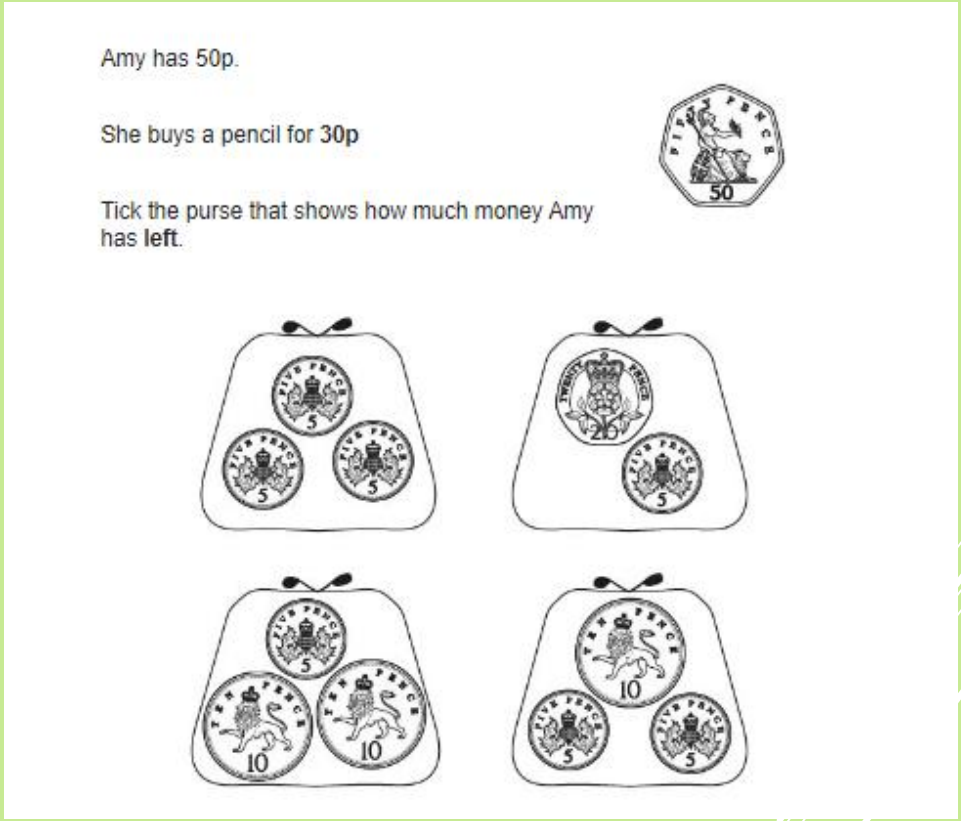
Buy one box for £1.90

Get the second box half price.

Ali buys two boxes of cereal.

How much must he pay **altogether**?



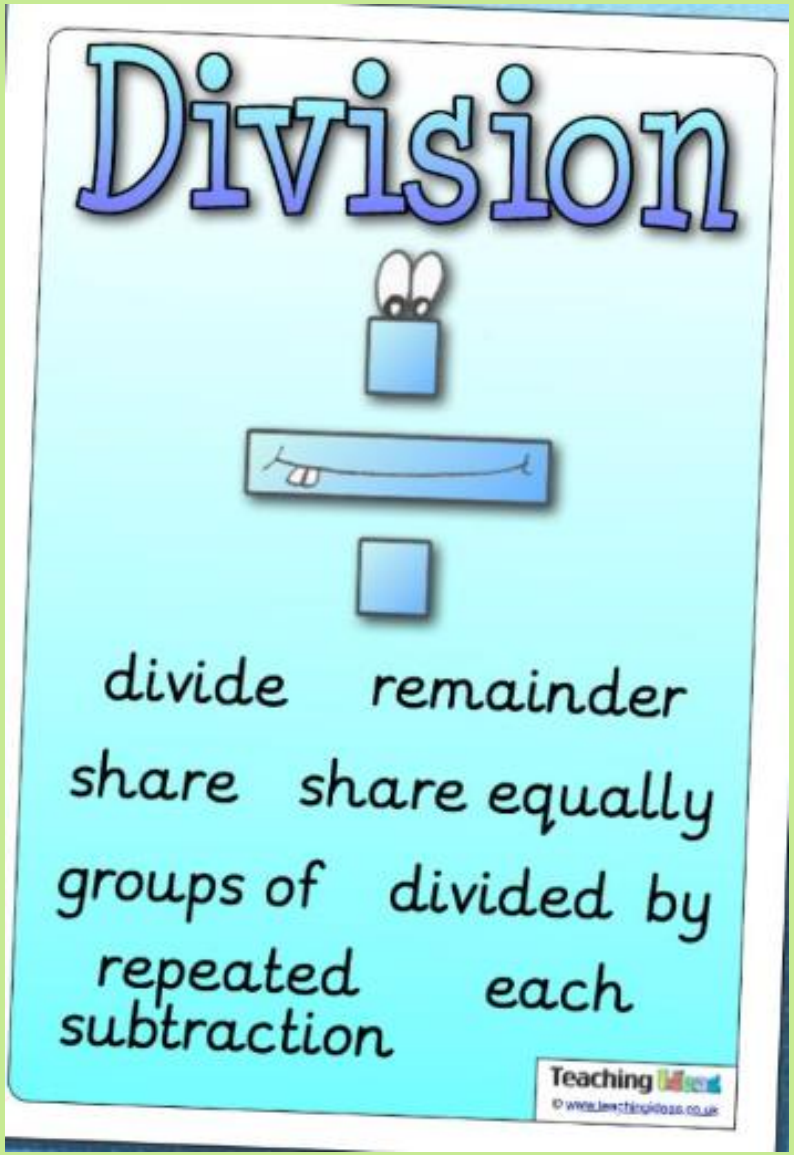


SUBTRACTION

Use the digits **2, 3** and **4** once to make the multiplication which has the **greatest product.**

☐ ☐ × ☐

MULTIPLICATION



This 850 ml bottle of squash makes 17 drinks.

How many millilitres of squash are in each drink?

Desi and Ella share this money equally

How much do they each get?

DIVISION

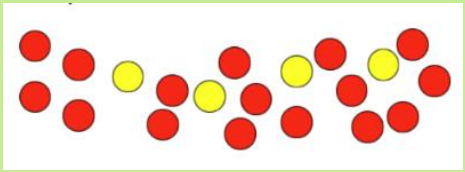
Key principles of a maths mastery approach

Stem Sentences

Stem sentences are used to generalise a key concept and are usually complete sentences.
They help children to answer questions fully, using correct mathematic vocabulary, and to help to tackle more reasoning type questions where children have to explain their answers.

Some examples:

- For every _____ yellow counter, there are _____ red counters
- _____ ones is equal to one ten
- _____ g is equivalent to 2kg.



Key principles of a maths mastery approach

Focuses on fluency, reasoning and problem solving

It gives children the skills they need to become competent mathematicians. We call the stages:

Calculate

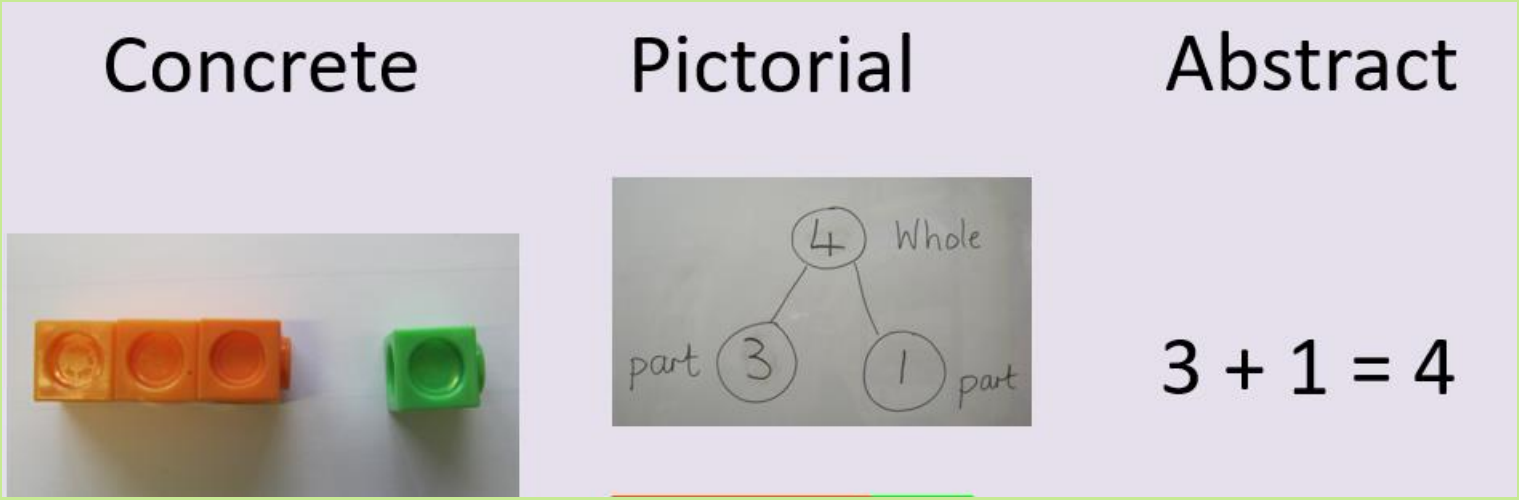
Apply

Think

Key principles of a maths mastery approach

Concrete Pictorial Abstract

At the heart of our mastery approach is the Concrete Pictorial Abstract (CPA) approach. Research shows that when children are introduced to a new concept, working with concrete physical resources and pictorial representations leads to a better understanding of abstract concepts. We use CPA throughout our schemes of learning.



There are 7 jelly babies and 5 fruit pastels, how many sweets altogether?

“Show me”

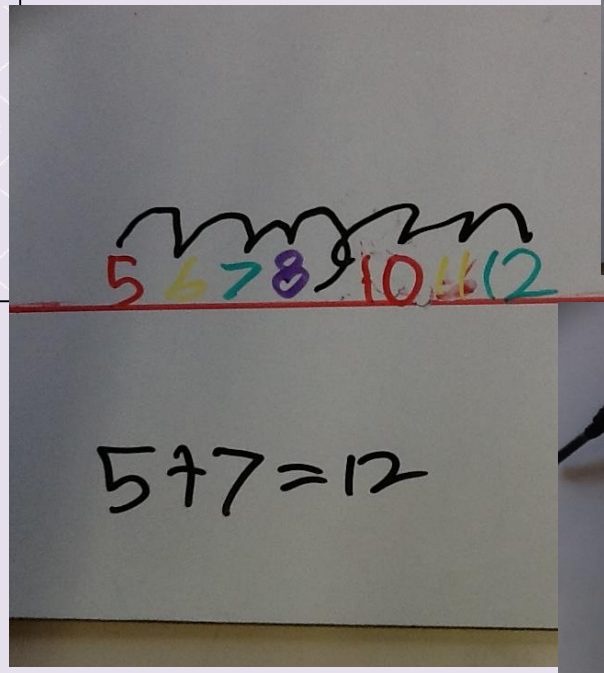
“Prove it!”

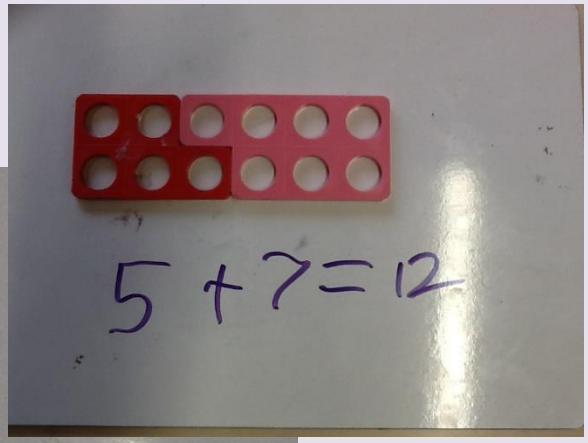
Represent your answer using concrete objects, pictures and number sentences. Have a go!

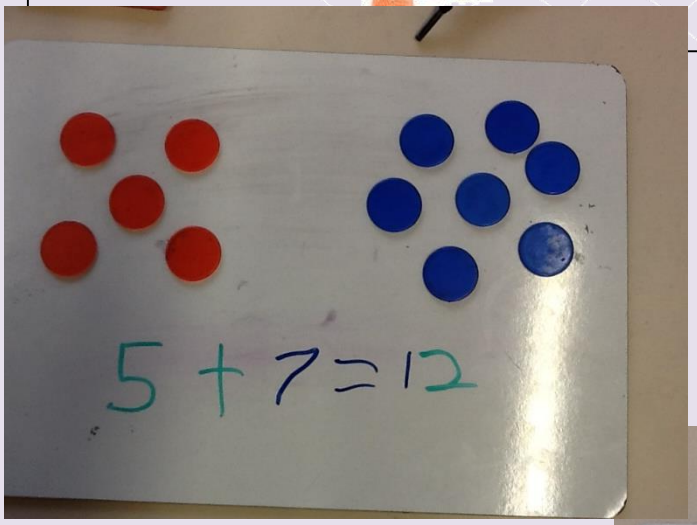
There are 7 jelly beans and 5 fruit pastels, how many sweets altogether?

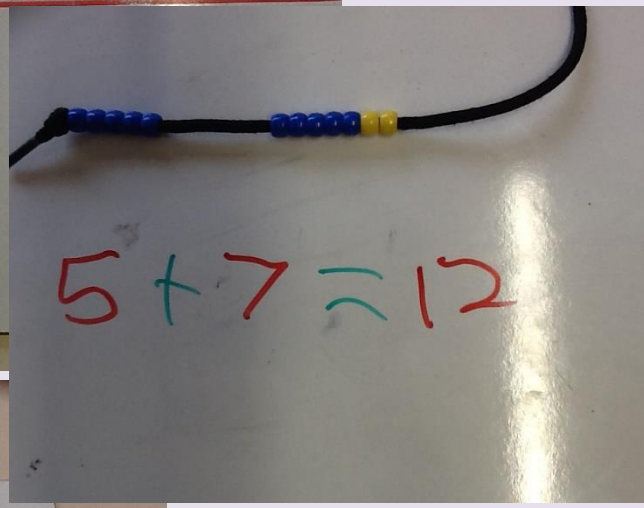
"Show me"

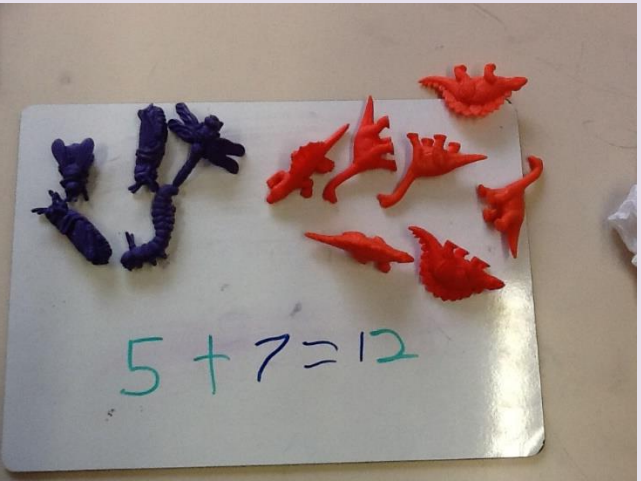
"Prove it!"

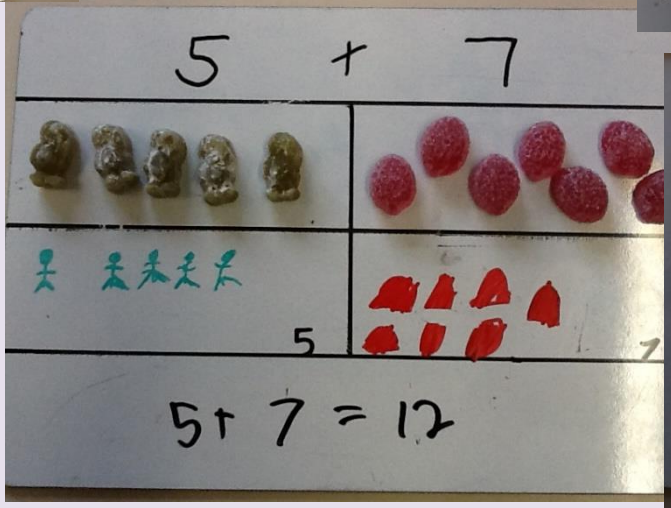


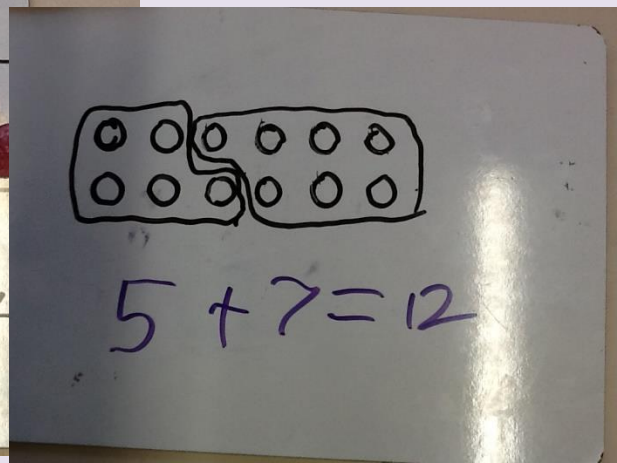










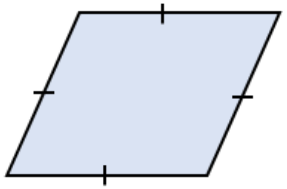


What does this look like in a typical lesson?

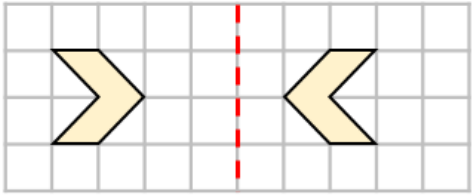
1. Lessons always start with a Flashback

Flashback 4

Year 5 | Week 6 | Day 1



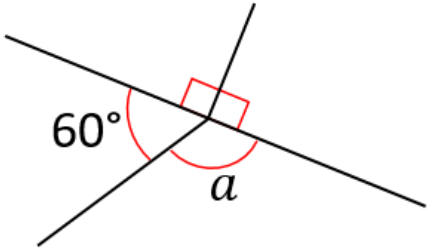
1) Has the shape been reflected correctly?



2) Complete the table.

Coordinates	Translation	New coordinates
(2, 6)	2 left and 3 up	

3) Calculate angle a.



4) $1{,}266 \times 7 =$ ☐

White Rose Maths

2. Instruction/ Teaching

Key Points

- Interactive
- Lots of paired work and opportunities to use the mathematical language
- Children expected to answer in full sentences
- Focus on how they got to their answer
- Use of individual whiteboards so teachers can asses all children's understanding
- Support staff will then support any identified children

3. Independent work

- Some children will get started on their independent work quicker than others as some may need further instruction or modelling
- Children will normally start on the '**Calculate**' stage
- Some children who have shown secure understanding during the carpet session, may skip the calculate stage and go straight to the '**Apply**' or '**Think**' stage
- **'Think Challenge'** question for extra challenge
- **Live Marking** throughout lesson. Misconceptions promptly addressed
- Some examples of calculate, apply and think questions…

Example of **Calculate** style questions

Calculate

1 a) What method would you use to solve each of these divisions?

4,080 ÷ 10 4,080 ÷ 24

4,080 ÷ 4 4,080 ÷ 34

Talk about it with a partner.

b) Complete the calculations.

4,080 ÷ 10 = ☐ 4,080 ÷ 4 = ☐

4,080 ÷ 24 = ☐ 4,080 ÷ 34 = ☐

2 Use these multiples of 37 to complete the long divisions.

37	74	111	148	185	222	259	296	333

37 | 4 0 7 0

37 | 3 9 5 9

Calculate

Copy and answer these in your books

2526 rounded to the nearest 1000 is

7234 rounded to the nearest 1000 is

9355 rounded to the nearest 1000 is

8590 rounded to the nearest 1000 is

2864 rounded to the nearest 1000 is

5645 rounded to the nearest 1000 is

8750 rounded to the nearest 1000 is

1429 rounded to the nearest 1000 is

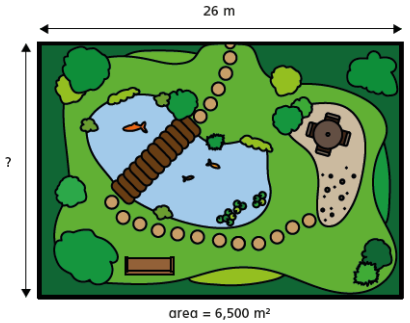
6982 rounded to the nearest 1000 is

9374 rounded to the nearest 1000 is

Example of **Apply** style questions

Apply

3



What is the width of this garden?

Apply 1

Circle all the numbers that round to 38,000 to the nearest 1,000

38,350	38,499	37,500	38,500
37,690	37,099	37,999	38,098

4

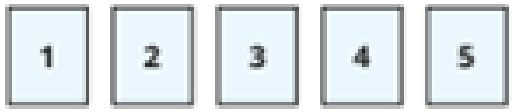
A bag of guinea pig food holds 2.375 kg of food.

It needs to last for 19 days.

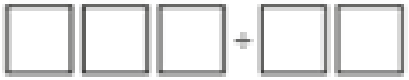
How much food can the guinea pig have each day?

Example of **Think** style questions

Think



Use each digit card once to complete the division in different ways.



Experiment to find divisions that give:

a) the smallest possible remainder

b) the greatest possible remainder

c) a remainder that is a multiple of 5

Caroline's daughter has an age that is a cubed number.

Next year her age will be a squared number.

How old is she now?

The area of a rectangle will always be more than the perimeter. True or False?

Example of **Think** style questions

Scott scores 20 out of 24 in a game.

Dani scores 5 out of 7

Compare their scores.

Explain who you think did better and why.

Are the statements always, sometimes or never true?

An even number has an even number of factors.

An odd number has an odd number of factors.

Max, Amir and Whitney are trying to work out which is the greatest fraction.

$\frac{3}{7}$ $\frac{13}{21}$ $\frac{5}{11}$

I am going to find a common denominator.

Max

I am going to find a common numerator.

Amir

I am going to compare each of them to $\frac{1}{2}$ to help me.

Whitney

Whose method do you prefer? _____

Explain your reasons.

_____

_____

Think 2

Richard says that $6 + 4 \times 9 = 90$
Is he correct? Explain your answer.

Think 3

Using the numbers 3, 4 and 5 and the operations +, −, × and ÷, make as many different numbers as possible.

Example of **Think** style questions

Think Challenge

Asha is thinking of 2 six-digit numbers.

My numbers have a difference of fifty.

When they are both rounded to the ten nearest thousand, the difference is 10,000.

What could her numbers be? How many possibilities can you find?

Mastering Number – Reception and Y1

This programme, called "Mastering Number' is aimed at strengthening the understanding of number, and fluency with number facts, among children in the first three years of school.

This project aims to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave KS1 with fluency in calculation and a confidence and flexibility with number. Attention will be given to key knowledge and understanding needed in Reception classes, and progression through KS1 to support success in the future

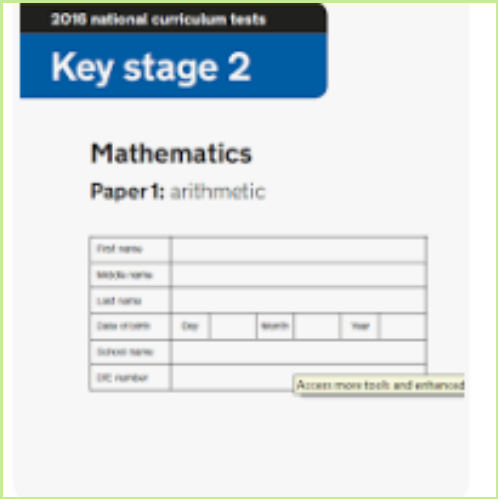
https://vimeo.com/718208696

Strategies for Addition, Subtraction, Multiplication and Division . . .

come to session on 2nd December

End of primary school expectations and Year 4 Multiplication Tables Check

Year 6 SATs


2016 national curriculum tests

Key stage 2

Mathematics

Paper 1: arithmetic

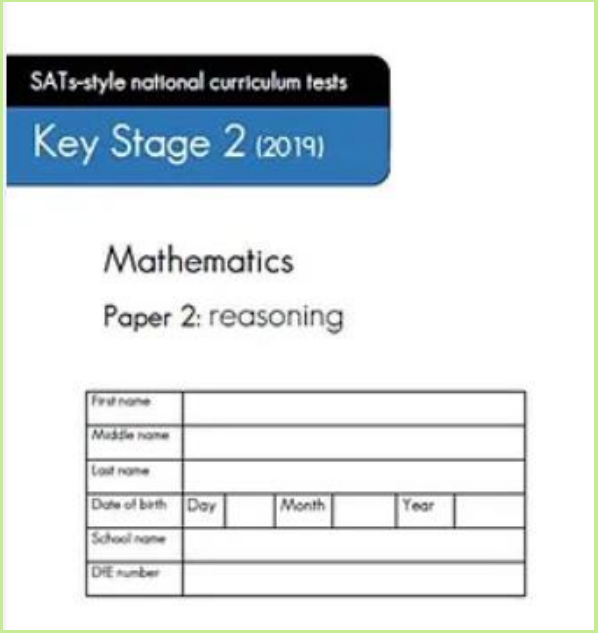
630 - 98.93 =

28 93% of 420 =

27.42 ÷ 6 =

29 9416 ÷ 12 =

1 2 | 9 4 1 6

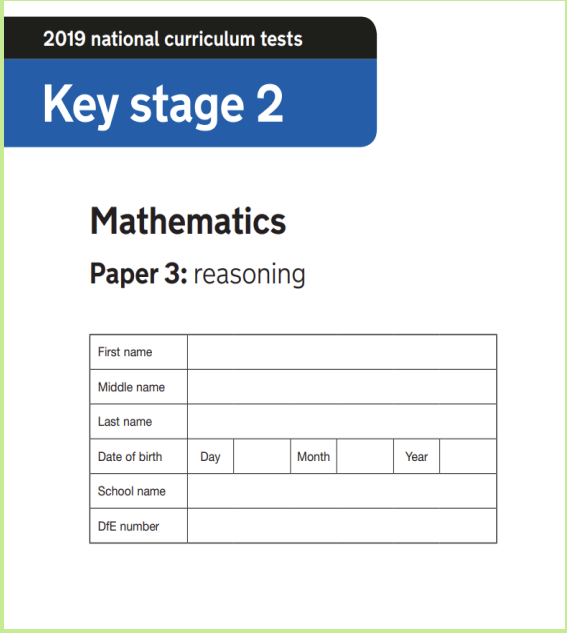

SATs-style national curriculum tests

Key Stage 2 (2019)

Mathematics

Paper 2: reasoning

First name						
Middle name						
Last name						
Date of birth	Day		Month		Year	
School name						
DfE number						


2019 national curriculum tests

Key stage 2

Mathematics

Paper 3: reasoning

First name						
Middle name						
Last name						
Date of birth	Day		Month		Year	
School name						
DfE number						

There are 25 classes in a school.

Each class has 34 pupils.

62% of all the pupils play a sport after school.

What number of pupils do not play a sport?

This table shows how many people finished the New York Marathon in each of the first four decades it was held.

New York Marathon	
Decade	**Total number of people who finished**
1st decade	24,863
2nd decade	170,932
3rd decade	282,420
4th decade	350,824

What is the mean number of people who finished the marathon per decade? Round your answer to the **nearest hundred**.