Maths Calculation Policy

Last updated: 18/08/2020

Inspire Partnership

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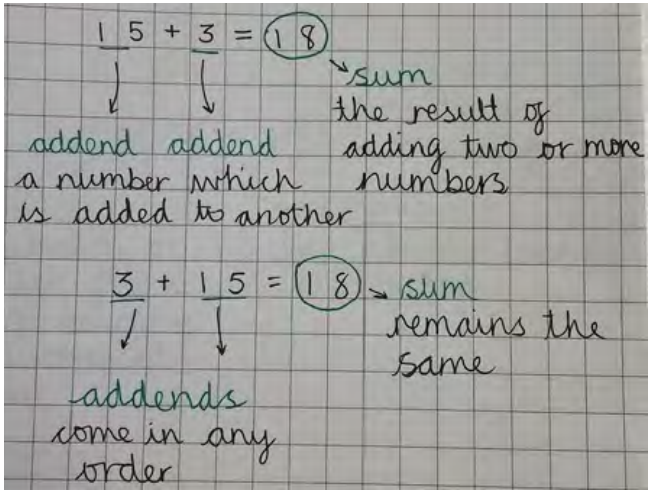
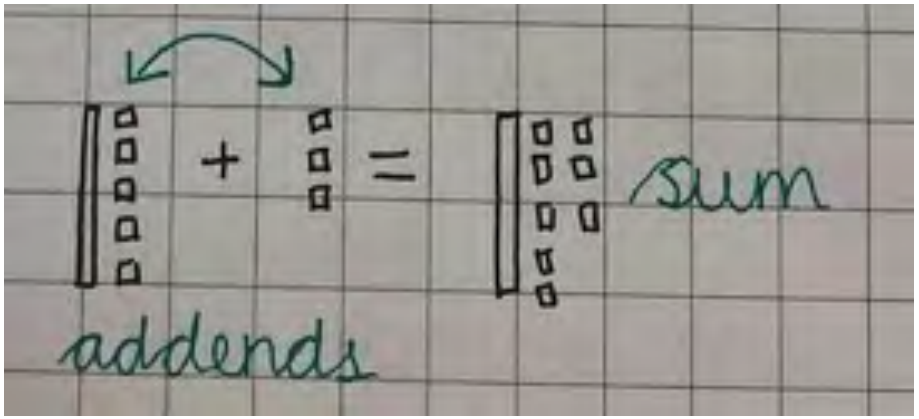
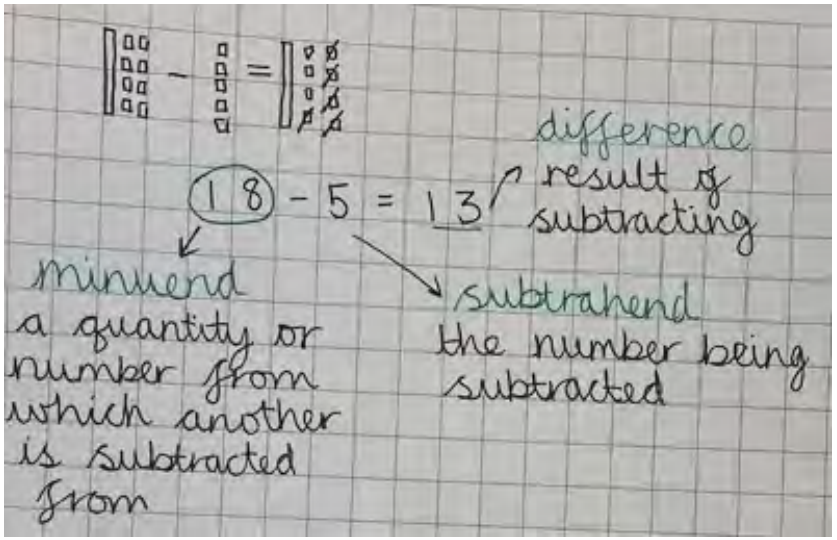
Vocabulary

Addition

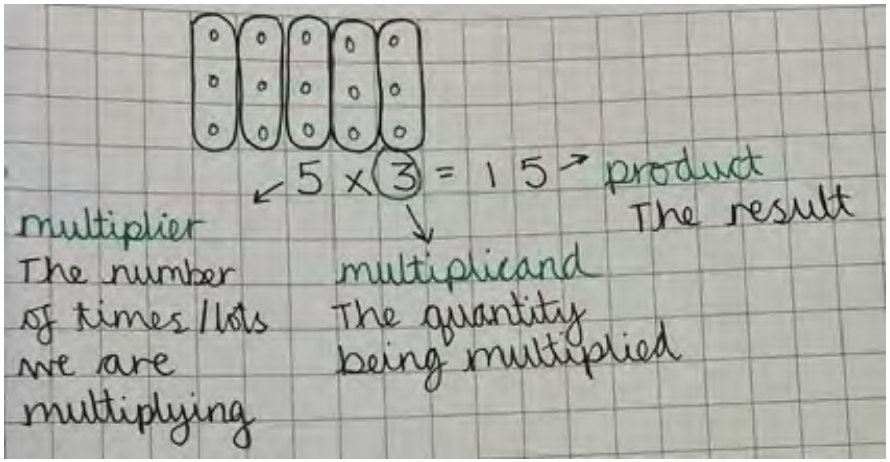


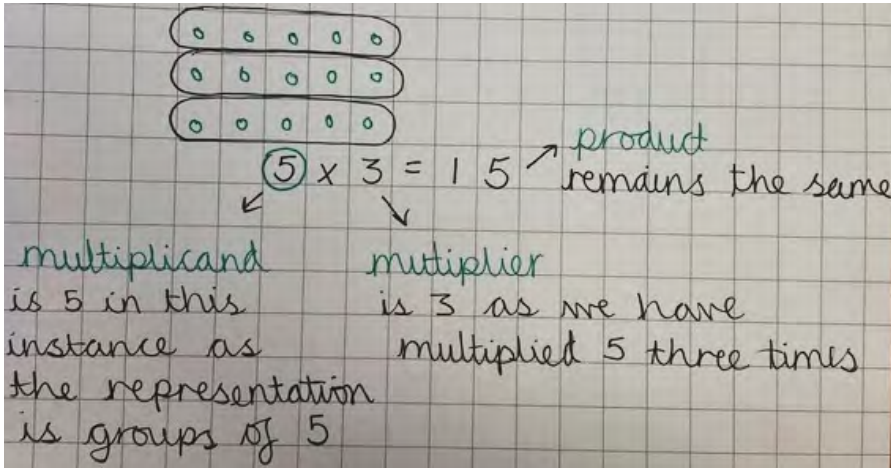


Subtraction

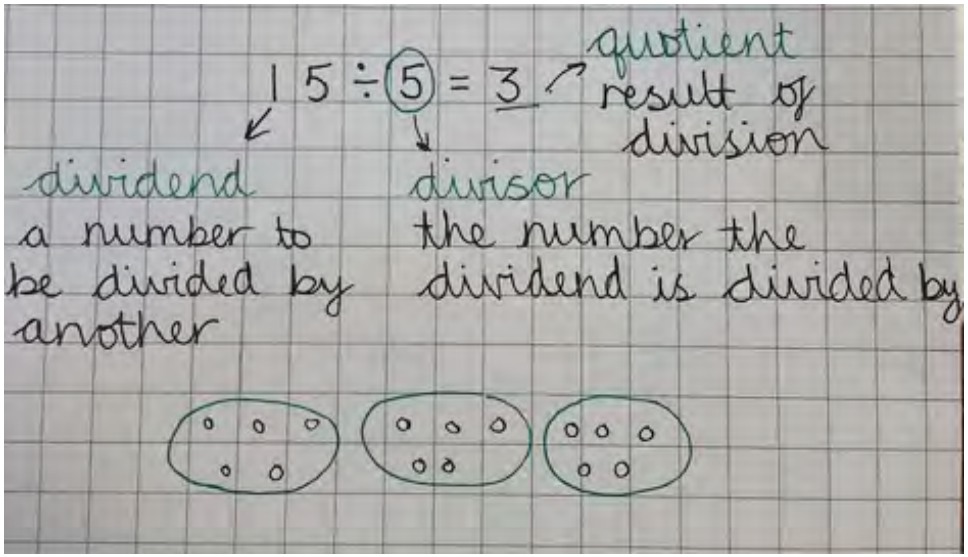


Multiplication





Division



Early Years Addition

KPIs

Pupils should be able to:

- Find one more than a number
- Using quantities and objects, add two single digit numbers and count on to find the answer

Class teacher will model key vocabulary; however, children are not expected to use this vocabulary.

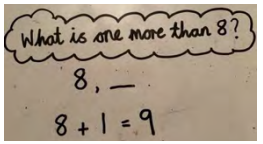
Adding 1 More Than a Number

Use of everyday objects, cubes, numicon and counters to represent finding **one more** than any given number up to 20.

Use of pictorial representations to count **one more** than a number.

One more than 4 is 5.

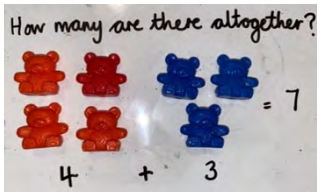
Children could use a number line to draw on jumps of one to find **one more** than a number.

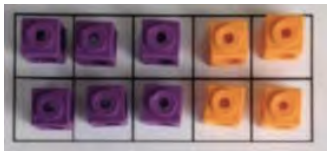


Use of mental strategies to count on from the biggest number to find **one more.**

Adding Two Single-Digit Numbers

Use of concrete resources to represent **addition**- combining two parts.

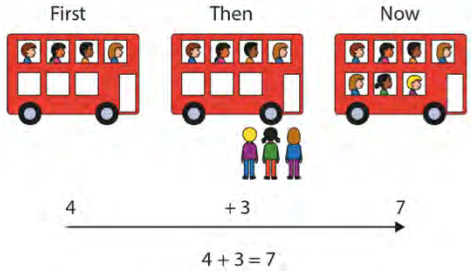




6 + 4 = 10

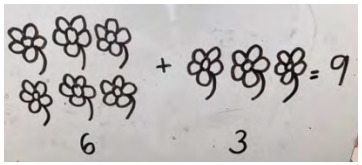
Addend + **Addend** = **Sum**

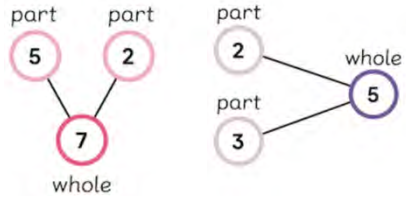
Children can also represent **addition** by **adding** more using a number story.



First, there were 4 people on a bus.
Then, 3 more people got onto the bus.
How many people are there on the bus now?

Children to move on from drawing objects/ images to using **part-part whole model**.





Year One Addition

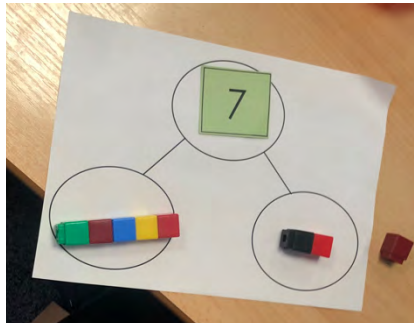
KPIs

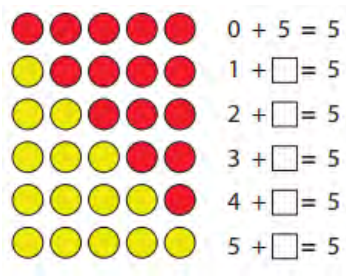
Pupils should be able to:

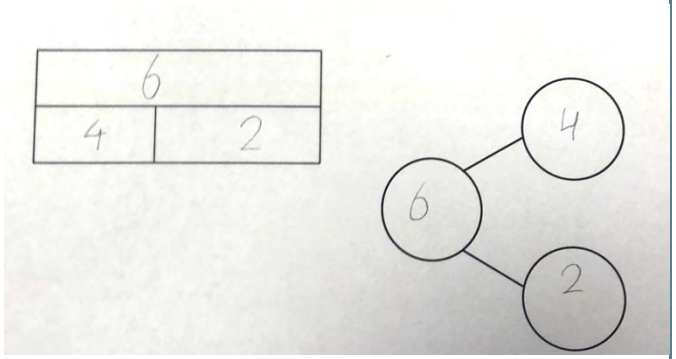
- Read, write and interpret mathematical statements
- Represent and use all number bonds within 20
- Add one-digit and two-digit numbers to 20, including 0
- Solve one-step problems using concrete objects and pictorial representations, and missing number

Number Bonds within 20

Use of cubes and a **part – part whole** model to represent **number bonds** within 10. Use known facts within 10 to solve within 20.	Use of pictorial representations and working systematically to spot patterns. **Bonds** to 10 compared with 20.	More abstract representations utilised alongside mathematical **addition equations**

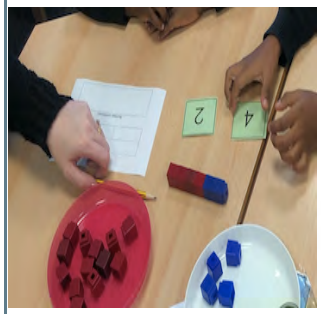


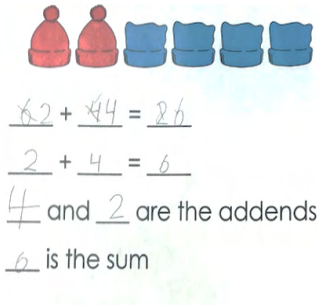




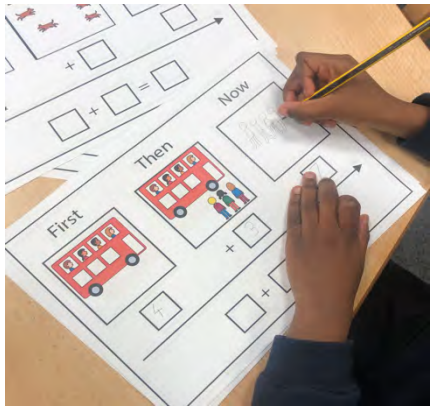
Adding one-digit numbers

Use of cubes, **part – part whole and** pictorial representations to understand adding as **aggregation**

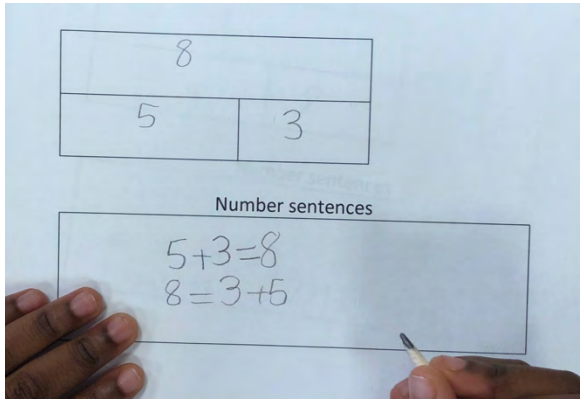




Ten frames and pictorial representations used side by side to understand addition as **augmentation** (first, next, then)

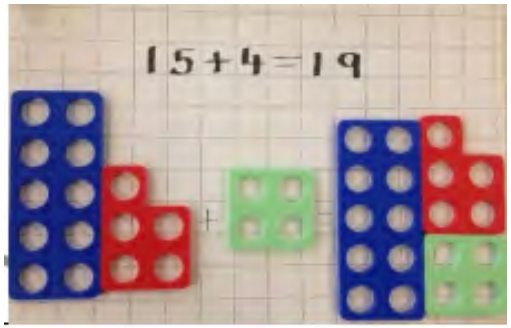


More abstract representations utilised alongside mathematical addition **equations**

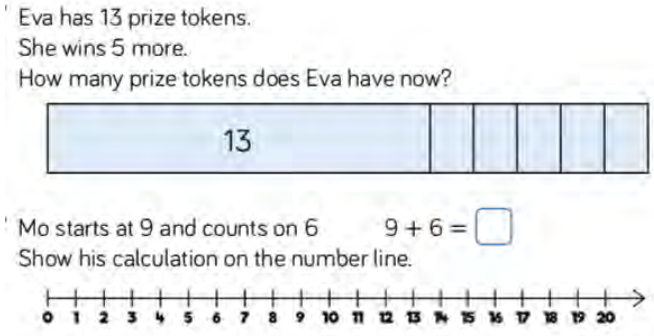


Add one digit and two-digit numbers within 20 by counting on

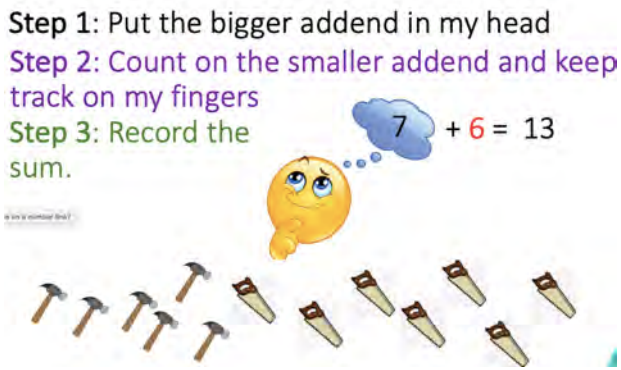
Children use practical equipment such as **numicon** to add by **counting on** from the larger **addend**. String beads may also be effective**.**



Use of pictorial resources such as teaching with a **bar model** or a **number line** can support children's understanding of **counting on**.

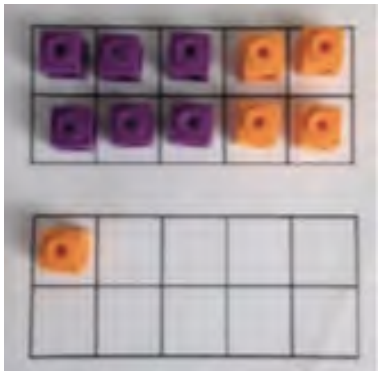


Children should **count on** using a **mental strategy** although this is to quickly move onto **circle by ten** and **making 10** as not as efficient to rely on.

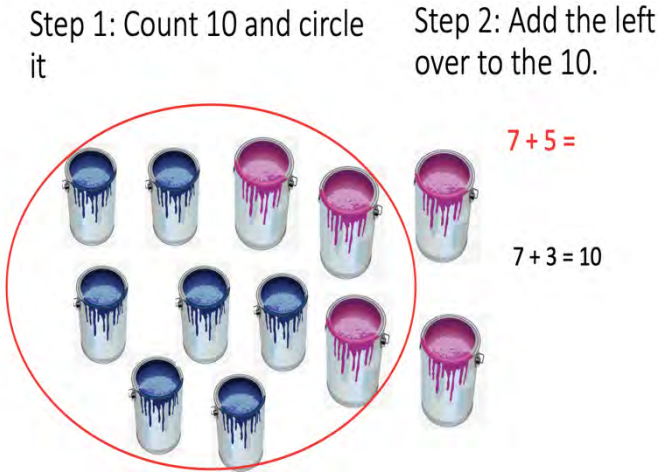


Add one – digit numbers crossing 10 (Add by Making 10)

Children use a 20 frame to support adding to make 10 first and then adding the left over. This is done in 2 steps through partitioning the smaller addend first.

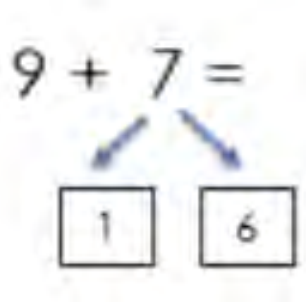


Circle by ten can be utilised before **partitioning** as a step is recorded.



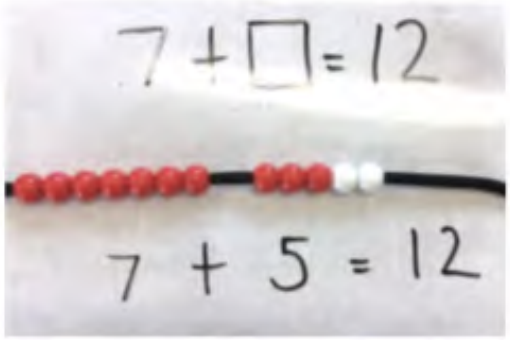
Children should show and record the abstract method of recording alongside the concrete and pictorial method.

Step 1: 9 + 1 = 10
Step 2: 10 + 6 = 16



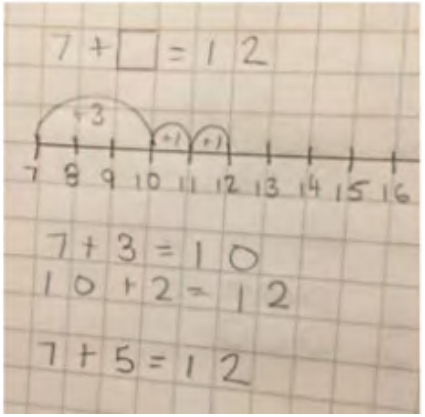
Solve one step problems, including missing number

Children will be taught to find the missing number by counting on from the smaller addend until they reach the larger addend, using concrete equipment.



This could be supported alongside the use of a **number line** or more abstractly **counting on** method.

When secure, they could **count on** in a **jump to 10** first and then count on to the **sum.**



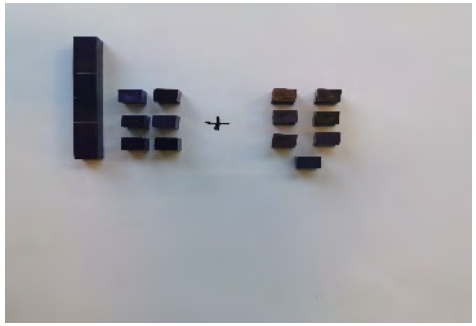
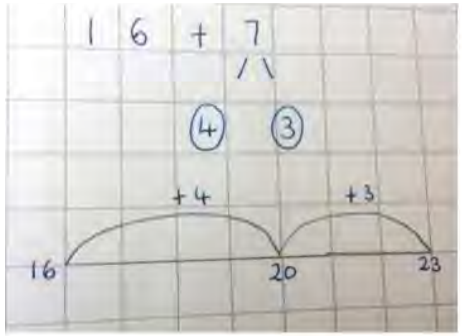
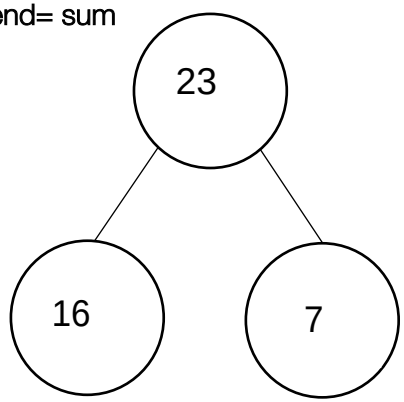
Year Two Addition

KPIs

Pupils should be able to:

- partition a two-digit number into tens and ones to demonstrate an understanding of place value, though they may use structured resources1 to support them
- add and subtract two-digit numbers and ones, and two-digit numbers and tens, where no regrouping is required, explaining their method verbally, in pictures or using apparatus (e.g. 23 + 5; 46 + 20; 16 – 5; 88 – 30)
- recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships.

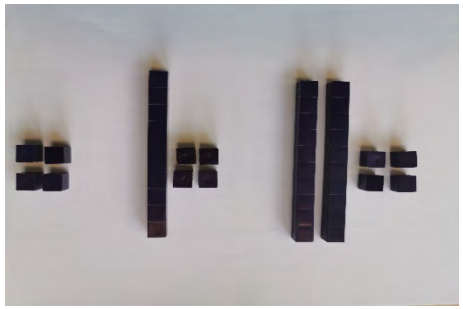
Adding 2 digits to 1 digit

Use of practical apparatus to support **adding** such as dienes, place value blocks, etc 16 + 7 = 23  **Addend + addend = sum**	Use of partitioning on a number line so children use knowledge of number bonds to **add.** 16 + 7= 16 + 4= 20 20 + 3= 23 	Use of whole part model to show addition. 16 + 7 = 23 **Addend + addend= sum** 

Adding tens to a number

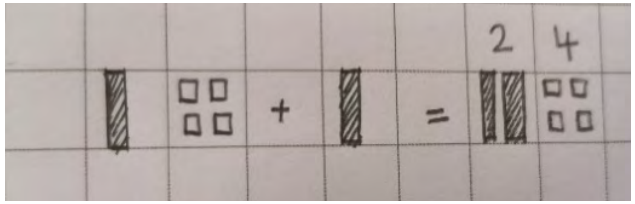
Use of practical apparatus to support **adding.**

4 + 10 = 14
14 + 10 = 24…

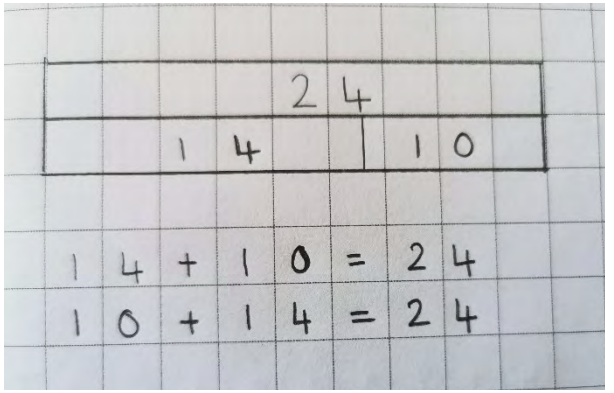


Through use of pictorial in books and children's jottings to support **adding tens.**

14 + 10 = 24



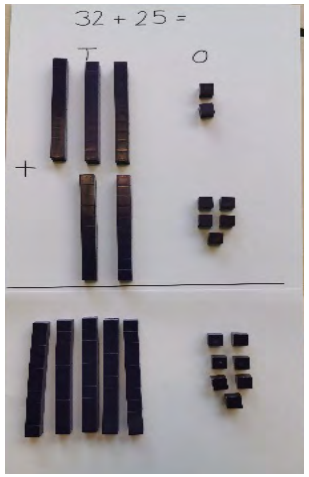
More abstract representations utilised alongside mathematical addition statements.



Adding 2 two-digit numbers (No regrouping)

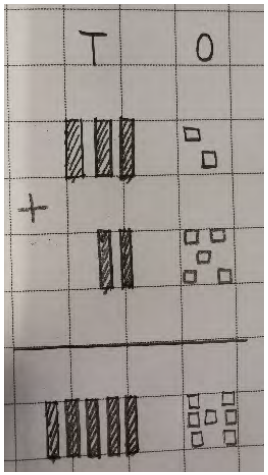
Use of dienes to **add.**
Add together the ones first then the tens.

32 + 25 = 57



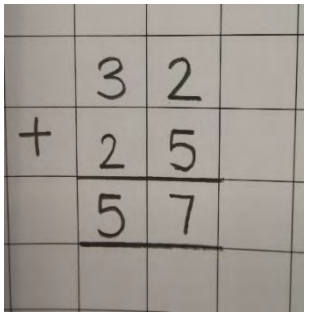
Use of children's drawings of dienes/images of dienes to support understanding.

32 + 25= 57



Children will use column method in books to show **addition** of 2 two-digit numbers with **no regrouping** preparing for year 3.

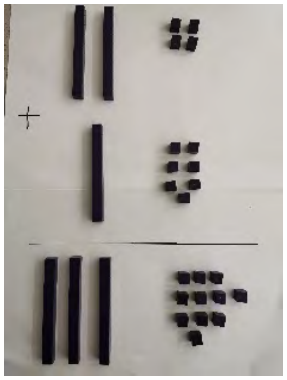
32 + 25= 57

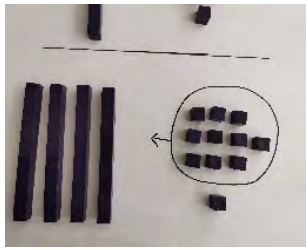


Adding 2 two-digit numbers (regrouping)

Use of dienes to **add** 2 two-digit numbers with **regrouping**.
Add together the **ones** first then the tens.

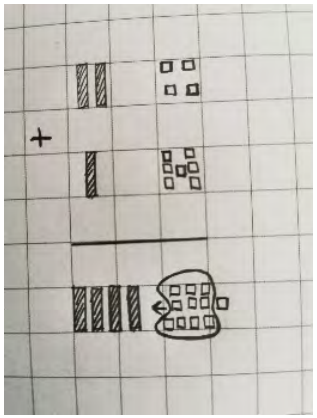
24 + 17 = 41



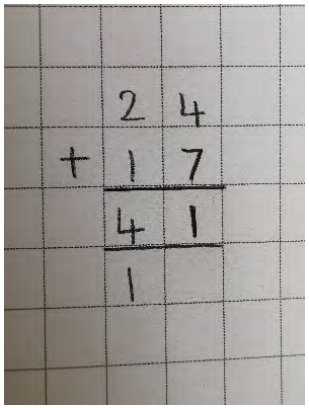


Use of children's drawings of dienes/images of dienes to support understanding.

24 + 17 = 41



Children will use column method in books to show **addition** of 2 **two- digit** numbers with **no regrouping** preparing for year 3.

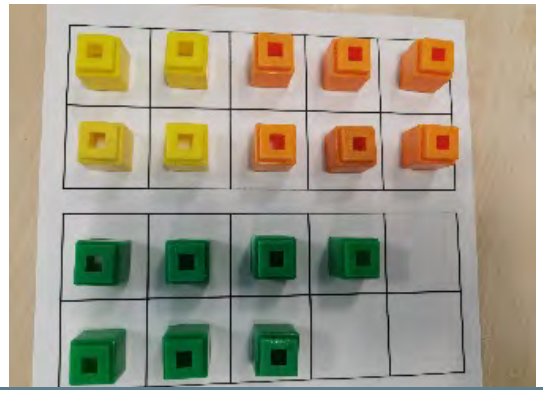


Adding 3 single-digit numbers

Use of ten frame to show visually

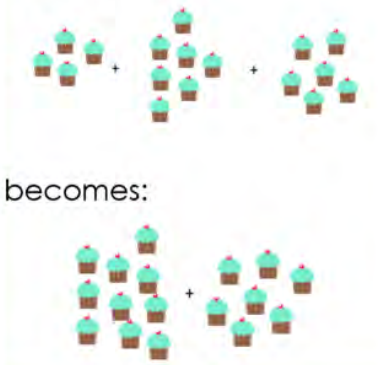
4 + 7 + 6 =17

Put 4 and 6 **together** to make ten. **Add** on 7

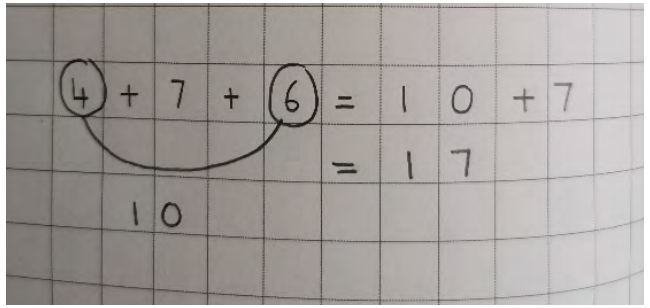


Add together three **groups** of objects. Draw a picture to **recombine** the **groups** to make 10.

4 + 7 + 6 = 17



Combine the two numbers that make 10 and then **add** the remainder.



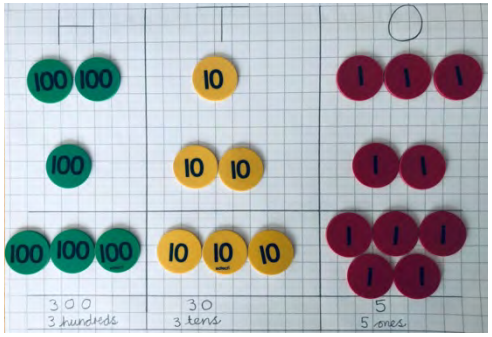
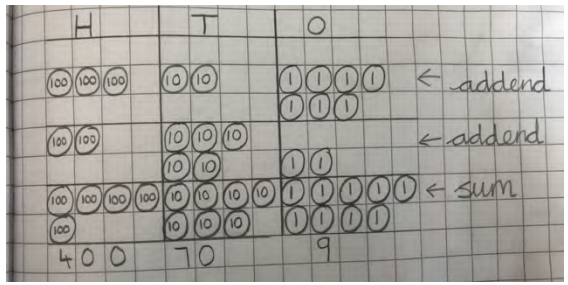
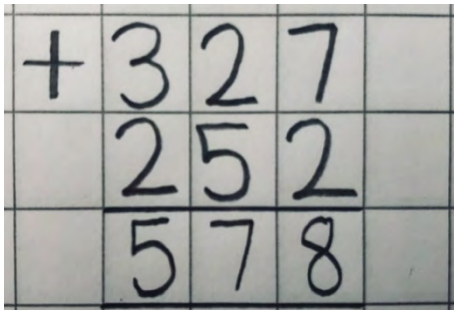
Year Three Addition

KPIs

Pupils should be able to:

- Add numbers mentally, including:
  - a 3-digit number and 1s,
  - a 3-digit number and 10s,
  - a 3-digit number and 100s
- Add numbers with up to 3 digits using formal written methods of column addition

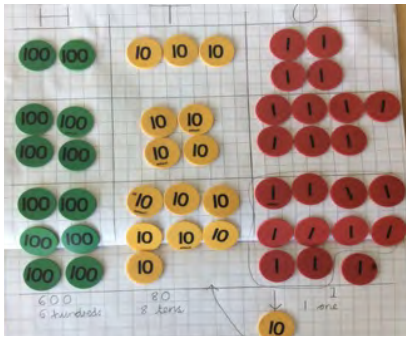
Adding 3-digit numbers (No Regrouping)

Use of either concrete **place value counters** and **dienes** to support adding: 213 + 122 = 335  	Supporting the calculation pictorially by drawing counters. 327 + 252 = 579  	Formal column method: 327 + 252 = 579 

Adding 3-digit numbers digit (with regrouping)

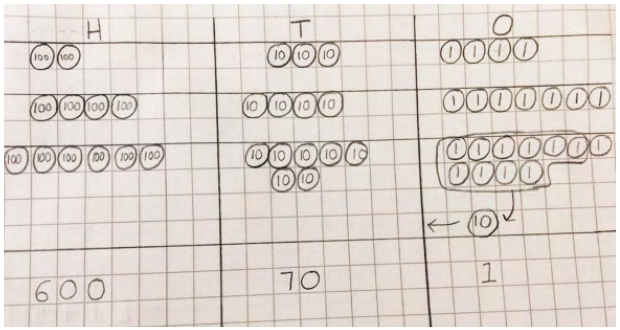
Use of concrete place value counters to show **regrouping:**

237 + 447 = 681



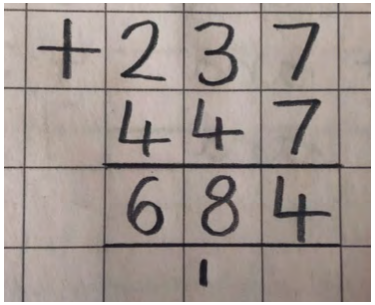
Supporting the calculation pictorially by drawing

237 + 447 = 681



Formal column method with **regrouping** shown at the bottom

237 + 447 = 684



Bar model and word problem

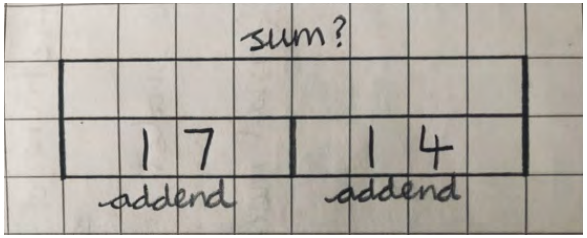
Read the problem, underlining the **key information**

In the class there are 14 girls and 17 boys. How many children are there altogether?

Identify addends and missing part in order to support this

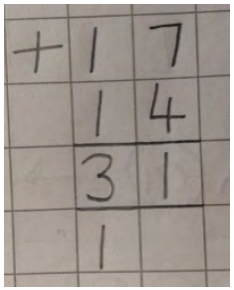
Identify the calculation and input into the **bar model** representation.

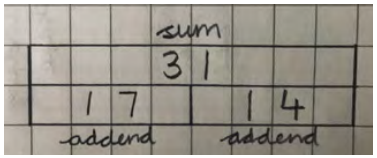
17 + 14 =



In the class there are 14 girls and 17 boys. How many children are there altogether?

Use method to identify **sum,** answering in a full sentence.

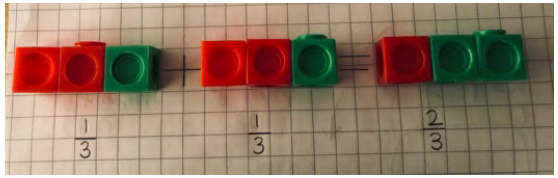




There are 31 children in the class altogether

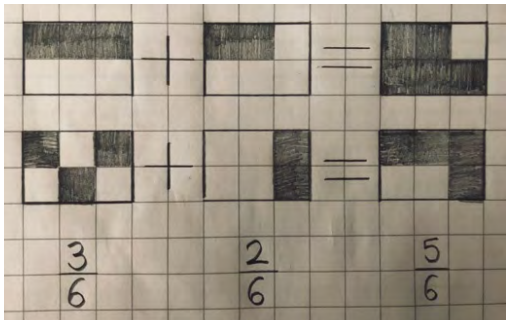
Adding fractions with the same denominator

Representation of **adding fractions** through use of **concrete materials** (cubes or counters)

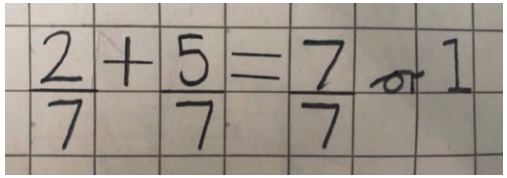


Nb: could also use liquids to represent this (pouring into container)

Pictorial representation via **shape**. Drawing shows variation of ways to represent the fraction in the shape



Abstract representation of adding fractions. When reaching the **whole,** it should be stated



Adding two fractions with the same denominator

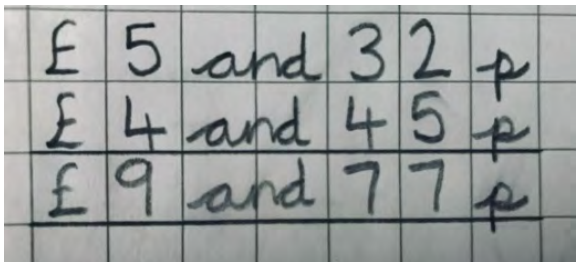
Adding money with and without regrouping

Adding money concretely **without regrouping** (Add the pounds then pence)

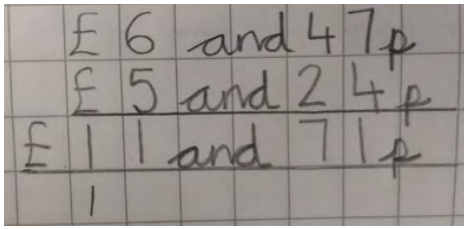
£5 **and** 20p + £10 **and** 50p = £15 **and** 70p

Adding money using the **column** method (**without regrouping**)

Not using decimal place in formal method



Adding money using the **column** method (**with regrouping**)



Not using decimal place in formal method

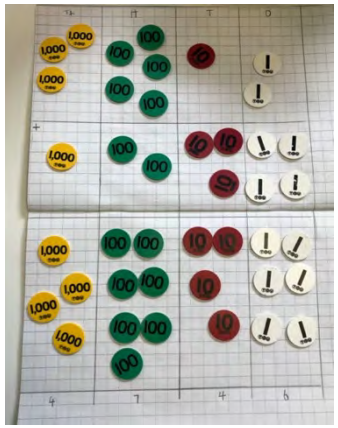
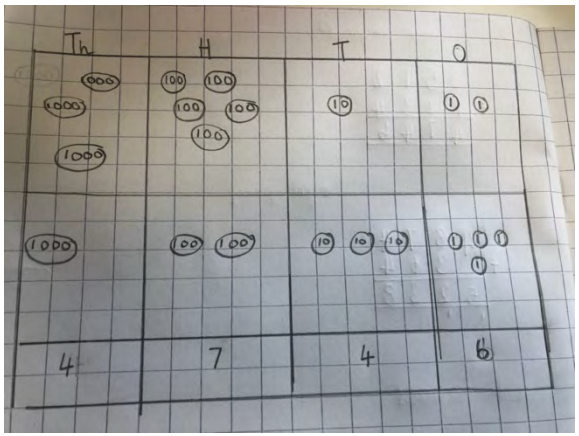
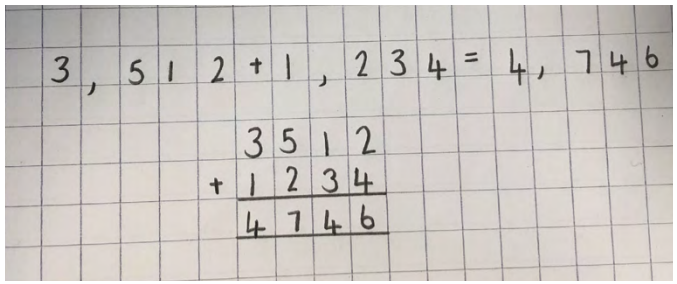
Year Four Addition

KPIs

Pupils should be able to:

- solve addition problems
- use formal methods to solve problems
- add numbers with up to 4 digits using the formal written methods of column addition

Adding 4-digit numbers no regrouping

Concrete (using **place value counters)**	**Pictorial** (drawing place value counters)	**Formal** (using the **column** method) When writing the number sentence, children will be taught to use a **comma after the thousand**
3,512 + 1,234= 4,746 	3,512 + 1,234= 4,746 	

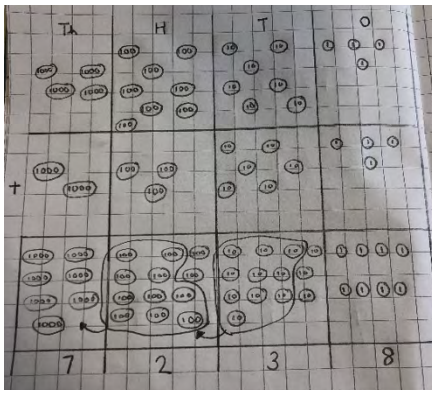
Adding 4-digit numbers with regrouping

Concrete (using **place value counters)**

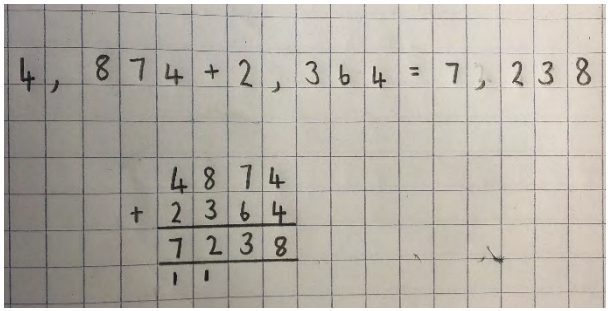
4,874+2,364= 7,238

Pictorial (drawing place value counters)

3,512 + 1,234= 4,746

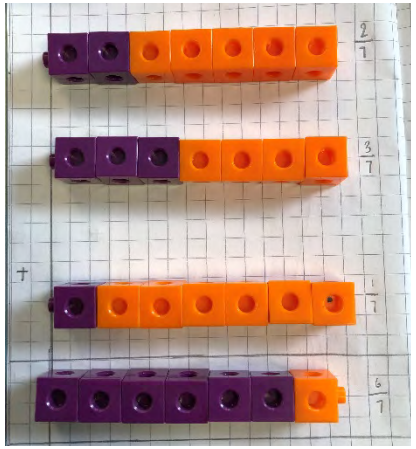


Formal (using the **column** method)
When writing the number sentence, children will be taught to use a **comma after the thousand**

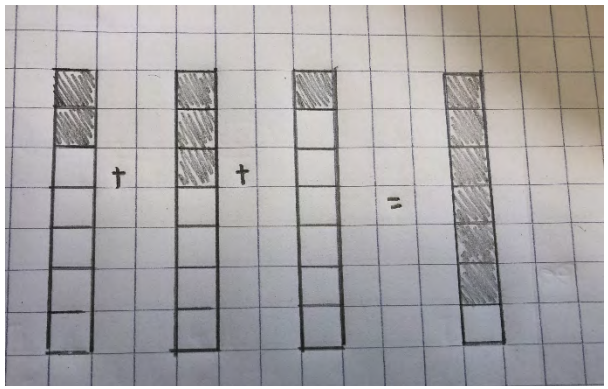


Adding 2 or more fractions with the same denominator

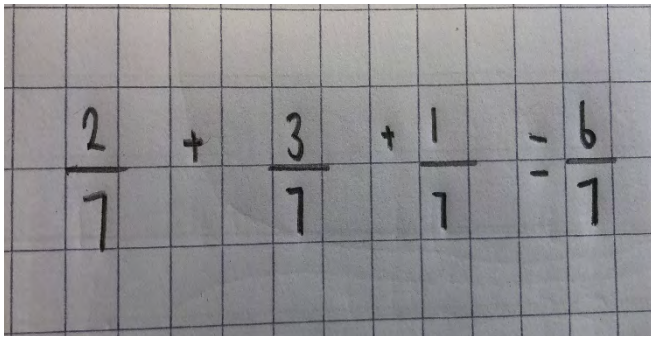
Concrete representation of **adding fractions** (cubes)



Pictorial representation using shape.



Abstract representation of adding fractions.



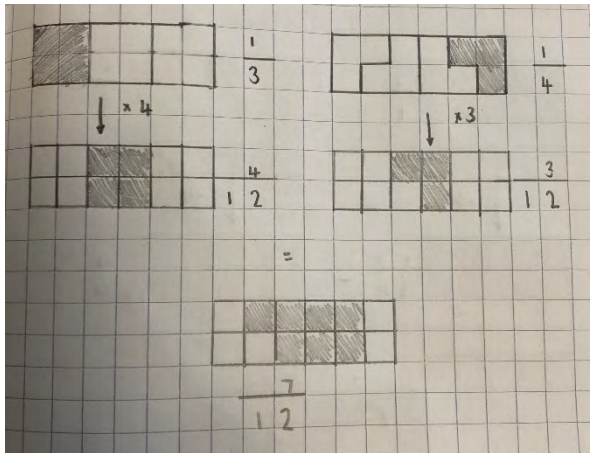
*when reaching the whole, it should be stated as the **fraction and 1.**

Adding fractions with different denominators

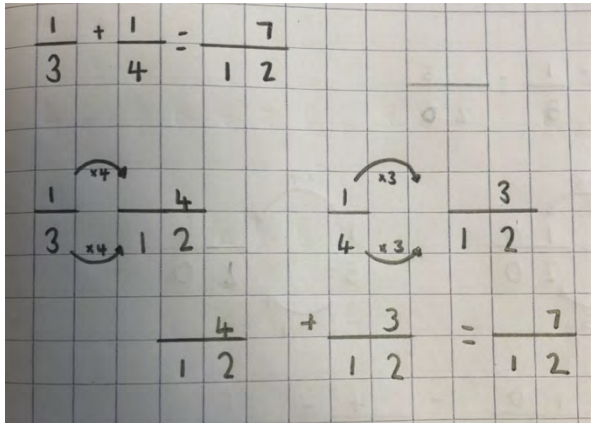
Remember to find the **key information** in the word problem.

Maizie has **one third** of the chocolate bar. Amie has **one quarter** of the chocolate bar. How much chocolate do they have **altogether**?

Pictorial

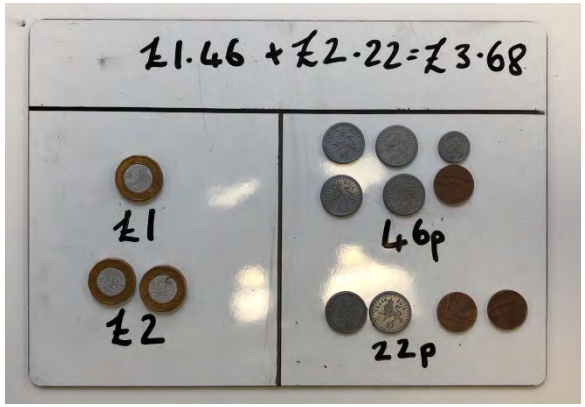


Abstract

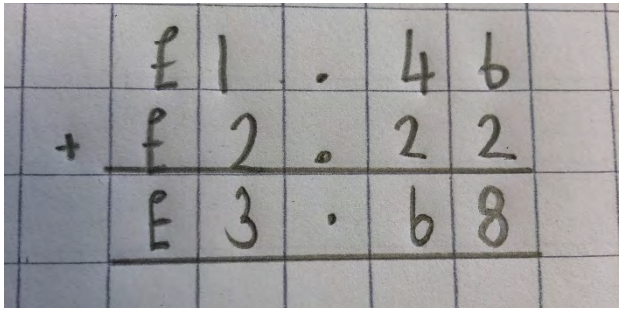


Adding money with and without regrouping

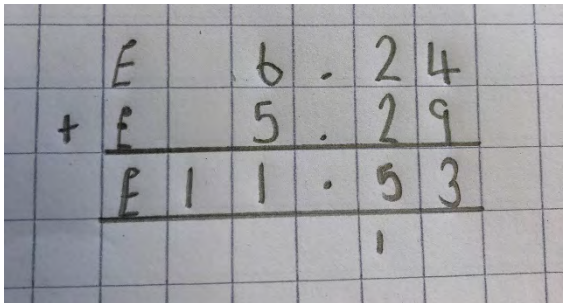
Concrete add the **pounds then pence**

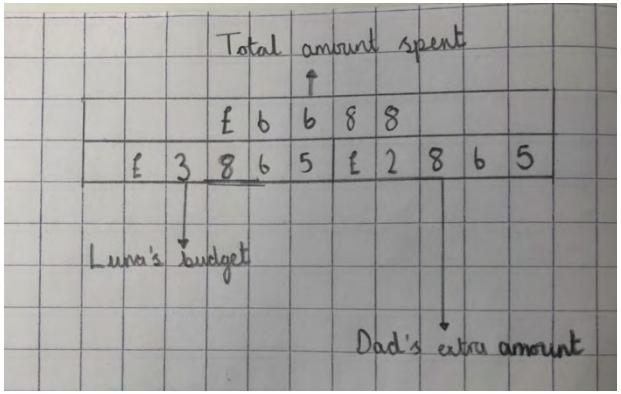
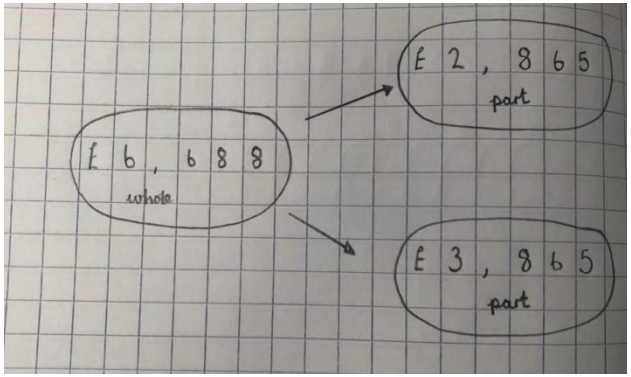


Adding money using the **column** method **without regrouping**



Adding money using the **column** method **with regrouping**



Bar model and part part whole model in number sentences		
Read the problem, underlining the **key information:** Luna had a budget of **£3,865** (**addend**) for her mums wedding. Her dad gave her **£2,823** (**addend**) more because she ran out of money. How much money did they spend altogether? **£3,865 + £2,865= £6,688**	**Bar model:**  	**Part-part whole model:** The two **addends** are the parts and the **sum** is the **whole** 

Year Five Addition

KPIs

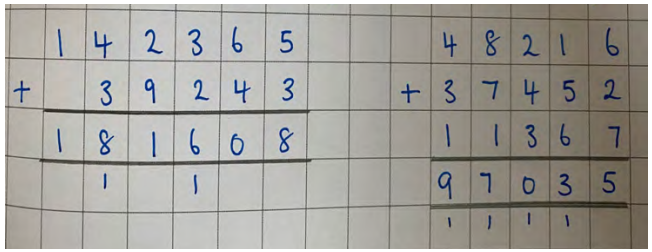
Pupils should be able to:

- Add whole numbers with more than 4 digits, including using formal written methods
- Add and subtract fractions with the same denominators and with denominators with the same multiples

Column addition with regrouping

142,365 + 39,243 = 181,608
48,216 + 37,452 + 11,367 = 97,035

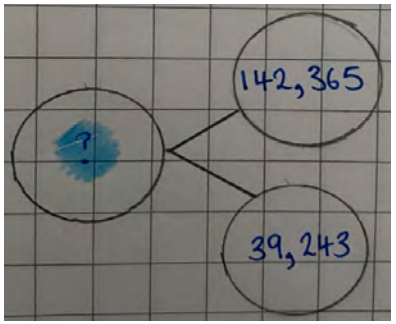
Children should use **column** addition when adding numbers with 4 or more digits. **Regrouping** should be used where calculations cross ten and should be denoted under the calculation line.



Part whole model

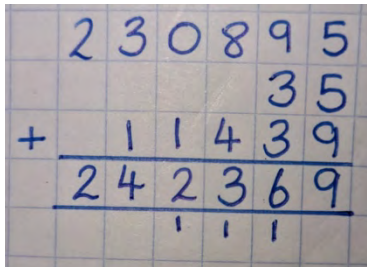
Part – whole model shows the relationship between numbers.

142,365 + 39,243 = ?



Children will apply this knowledge to other contexts.

A shop has 230,895 items to sell. In one particular day, 35 items are returned and they also buy in a further 11,439 items. How much stock do they now have?

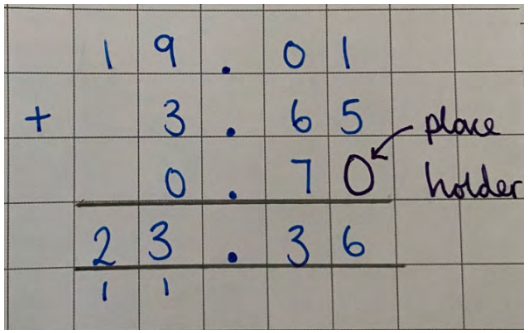


Column addition with decimals

Zero (0) should be used as a **place holder** to ensure that the numbers are to the same **decimal place**. The zero is added to show there is no value to add.

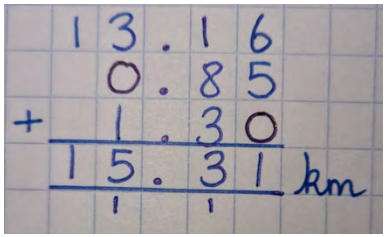
It is important that children recognise that they are adding **tenths and hundredths** and that they understand they are adding **part of a number** not a whole number.

Children need to be taught to line up the decimals using the decimal point. They should then use the place holder to balance the calculation.



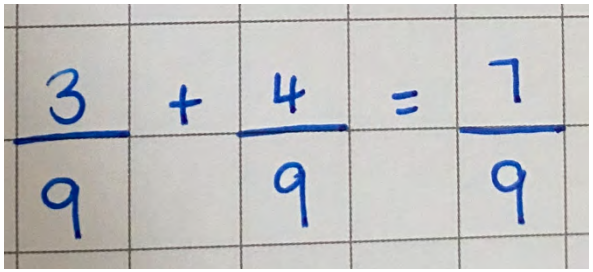
Children will apply this knowledge to other contexts.

Aman has travelled 13.16km from his home to go to the shops. He then travelled a further 850m to the post office before going barbers a further 1.3km away. How far has he travelled in km?



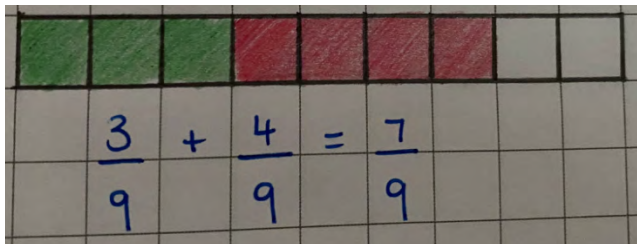
Adding fractions with the same denominators

Children should understand that **fractions** with the same **denominator** are parts of a whole and to add them, only the numerators change.



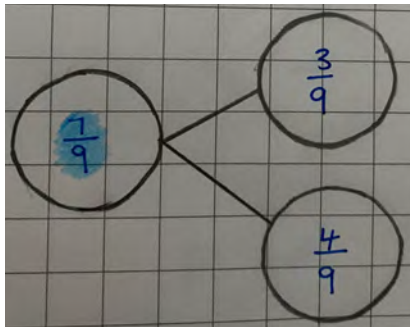
Bar model

Children should use the bar model representation to show this **visually** and to **aid understanding**. The children can also use this representation to aid questions with missing boxes.



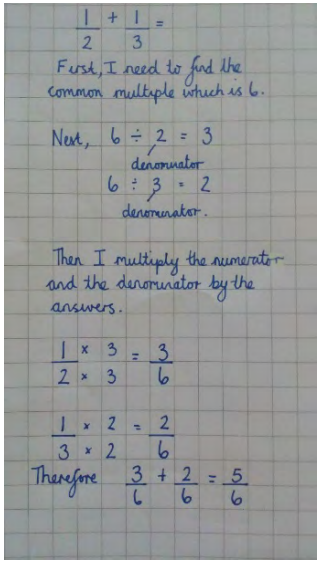
Part whole model

This relationship can also be represented using the **part – whole model** and can also be used to find missing values.

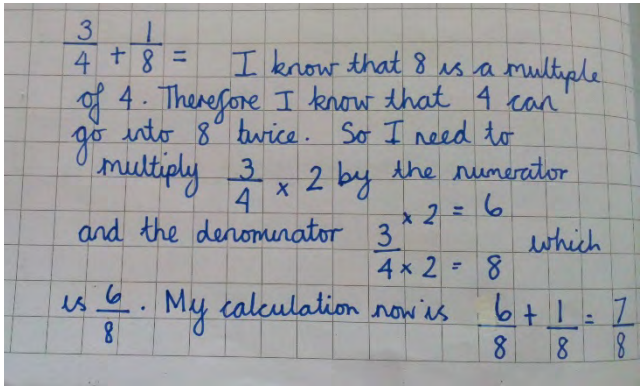


Adding fractions with different denominators

When adding fractions with different **denominators** children must first be taught how to find the **common denominators**.

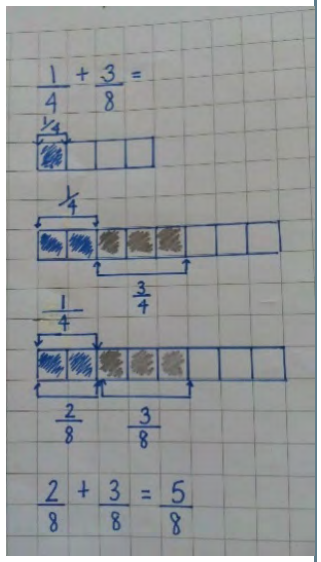


Children should be taught to look for **common multiples** where possible.



Bar Model

Bar model should be used to show fractions visually and aid understanding. This can be used to help find **equivalent fractions** and to aid the **addition of fractions.**



Year Six Addition

KPIs

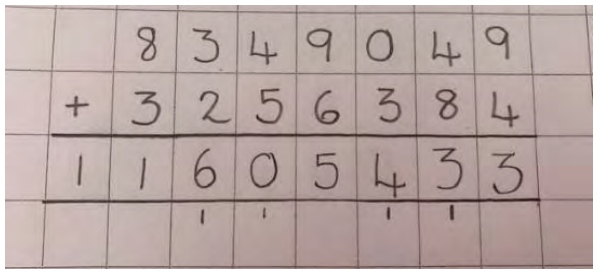
Children will be taught to:

- use column method to add numbers up to 10,000,000
- use column method to add numbers with up to three decimal places (3dp)
- to add fractions with different denominators
- to add mixed numbers

Column addition with regrouping

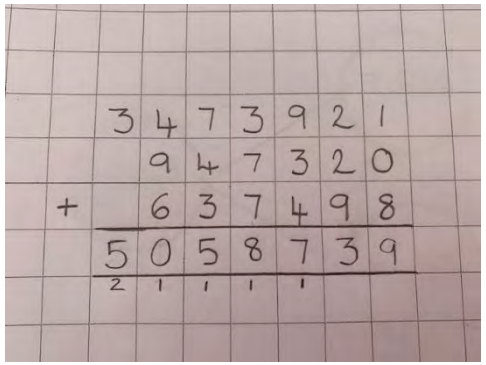
8,349,049+3,256,384 = 11,605,433

Children should use column addition when adding numbers with 4 or more digits. Regrouping should be used where calculations cross ten and should be denoted under the calculation line.



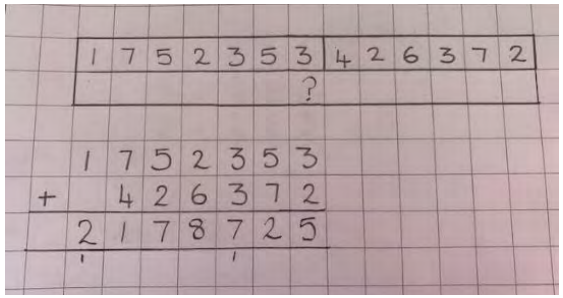
Adding more than 1 number

3,473,921+947,320+637,498 = 5,058,739



Bar model

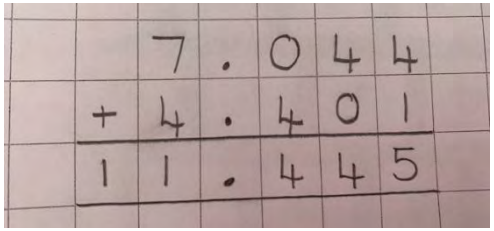
A gallery had 1,752,353 visitors in July. In August they had an extra 426,372 visitors, how many visitors were there in August?



Column addition with decimals

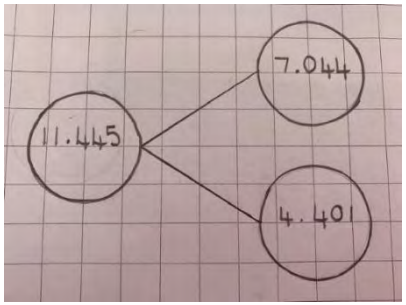
Recap Y5 decimal addition

4.041+7.044 =11.445



Part-whole model

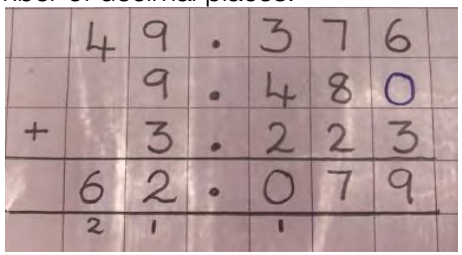
Part – whole model shows the relationship between numbers.



Recap Y5 decimal addition with 0 as a place value holder

49.376+9.48+3.223 =

Zero used as a place holder so all decimals have the same number of decimal places.

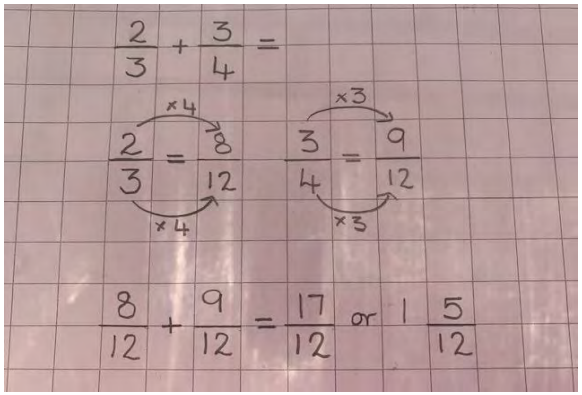


Adding fractions

Children should recap skills from Y5 adding fractions

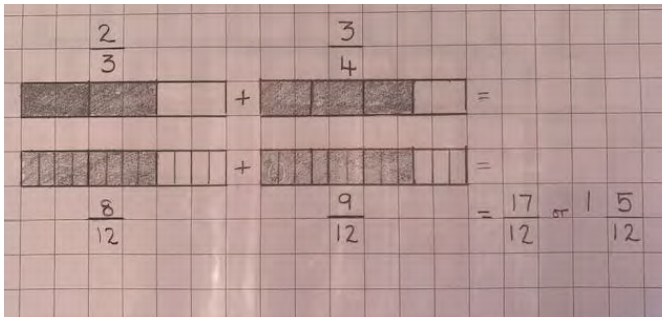
Adding fractions of different denominators

Find the common multiple and the quotient needs to be then multiplied by both the numerator and denominator.



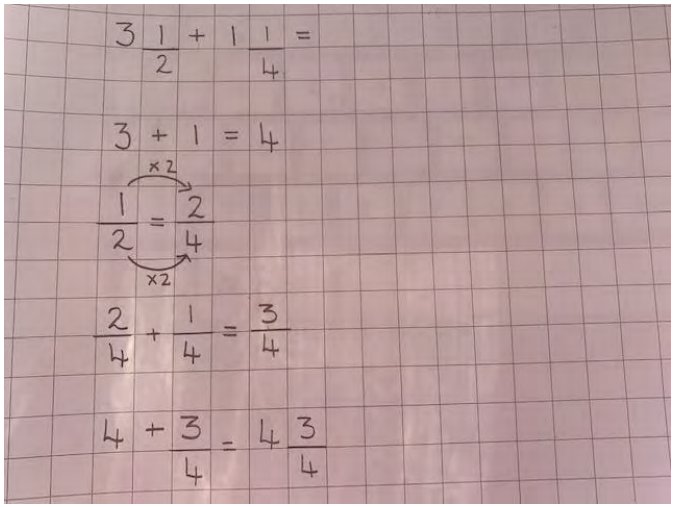
Bar model

Bar model make sure that your bar model represents the equivalent fraction that is being represented.

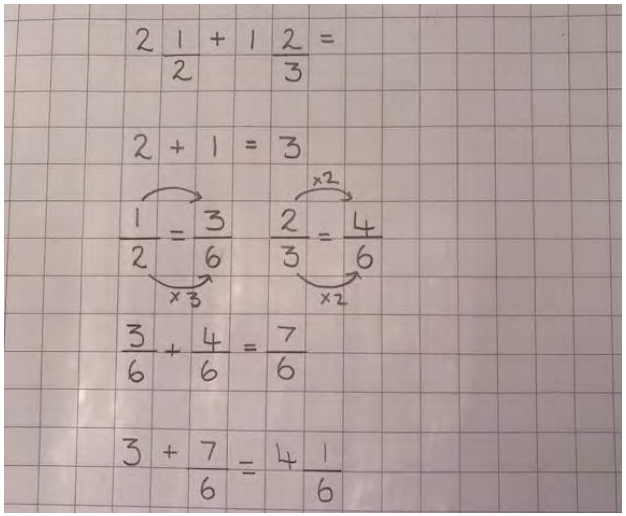


Adding mixed numbers

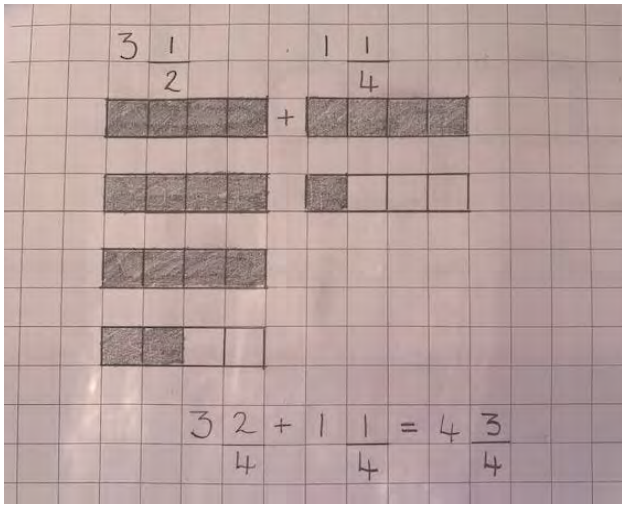
Adding mixed fraction add the whole numbers then find the common multiple then multiply the quotient by the numerator and denominator.



When the answer involves an improper fraction, this must be converted into a mixed number.



Bar Model



Early Years Subtraction

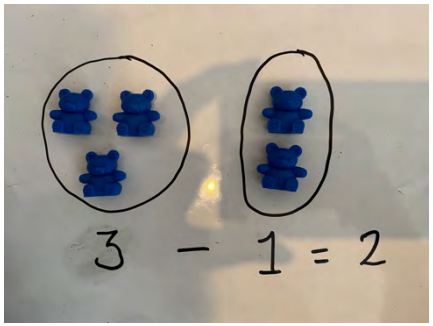
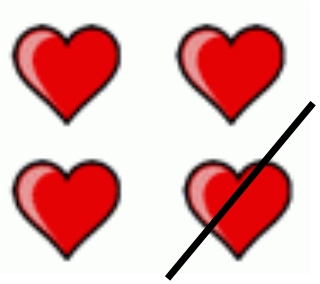
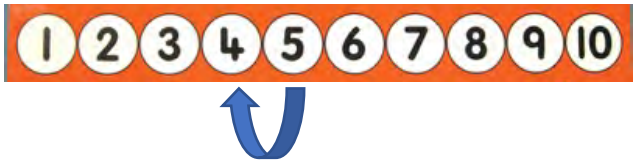
KPIs

Pupils should be able to:

- Find one less than a number
- Using quantities and objects, subtract two single-digit numbers and count back to find the answer.

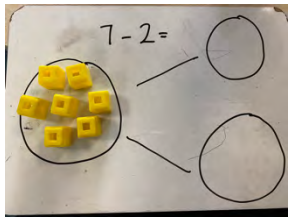
N.B. Class teacher will model key vocabulary; however, children are not expected to use this vocabulary.

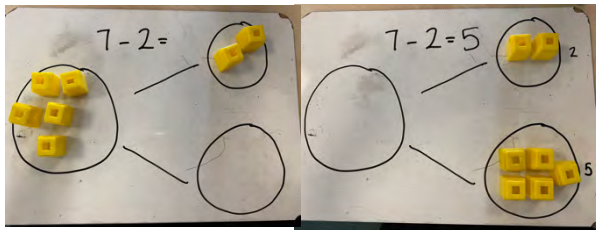
Finding One Less Than a Number

Use of everyday objects, cubes and counters to find one **less than** any given number to 20. 	Use of pictorial representations to find one **less than** a number by crossing out  One less than 4 is 3.	Use of a number track and a counter or whiteboard pen to **count back one less**. This is to be used alongside concrete resources.  One less than 5 is 4.

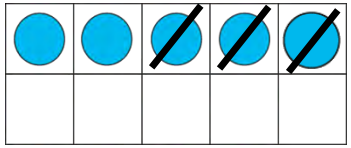
Subtracting Two Single-Digit Numbers

Use of everyday objects, cubes and counters to **subtract.**

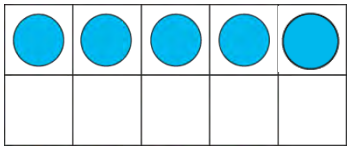




Children can draw and make use of pictorial representations using tens frames.

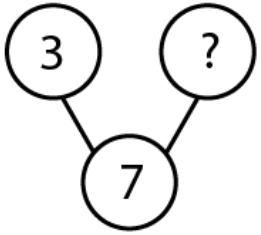


5 – 3 = 2



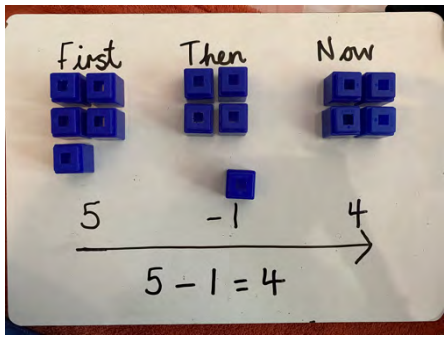
5 – 2 = 3

Children to move on from drawing objects/ images to using **part-part whole model**.

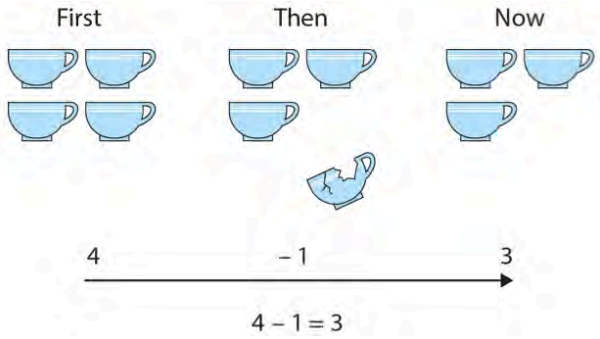


7 – 3 =

Use of concrete resources to model reduction as a form of subtraction.

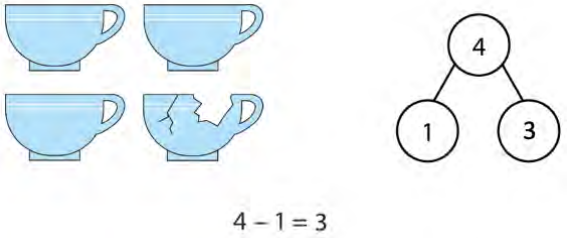


First, I had 5 cubes, then one was taken away, now I have 4 cubes.



First, I had four cups, then I broke one and threw it away. How many cups do I have now?

Children to use images or concrete resources alongside part whole model.



I have four cups. One of the cups is broken. How many cups are not broken?

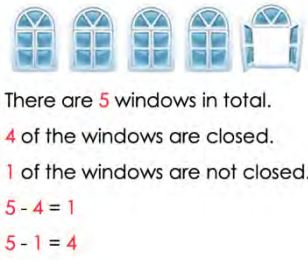
Year One Subtraction

KPIs

- Read, write and interpret subtraction mathematical statements
- Represent and use all number bonds within 20
- Subtract one-digit and two-digit within 20, including 0
- Solve one-step problems, including missing number

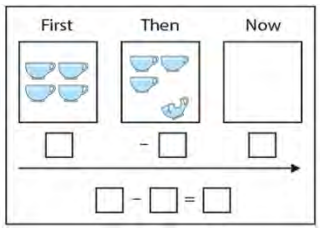
Subtracting one-digit numbers

Use of cubes, **part – part whole and** pictorial representations to understand **subtraction** as **partitioning.**

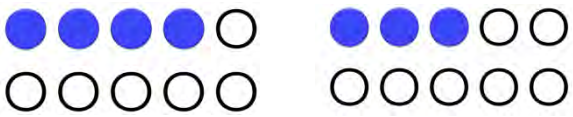


There are 5 cubes. 4 of them are green, 1 is yellow.

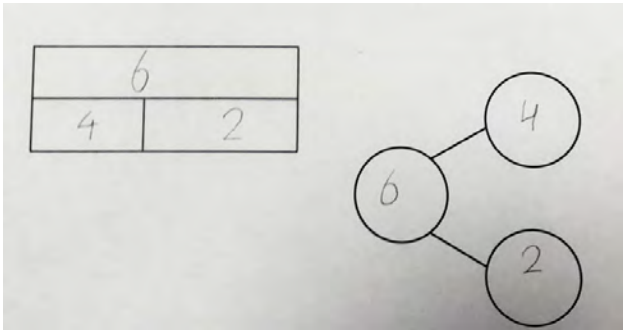
Ten frames and pictorial representations used side by side to understand subtraction as **reduction** (first, next, then)



First **z** **Then**

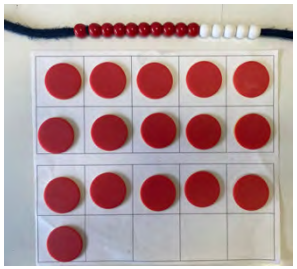


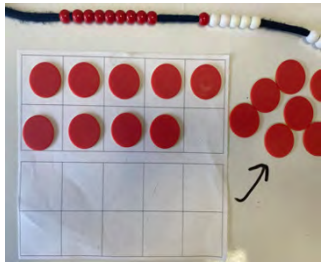
More abstract representations utilised alongside mathematical **subtraction equations**. Pupils may describe the answer as the **difference** but may not use the language of **minuend or subtrahend** at this point.



Subtracting one digit and two-digit numbers within 20 by counting back

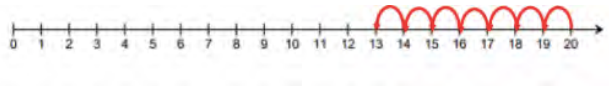
Children use practical equipment such as counters or string bead to **count back** from the **minuend**.





15 – 6 = 9

Use of pictorial resources such as teaching with a **bar model** or a **number line** can support children's understanding of **counting back**.



20	
7	13

Children should **count back** using a **mental strategy** although this is to quickly move onto **subtracting through ten** as counting back is not most efficient.

Step 1: Put the **minuend** or largest number in my head

Step 2: **Count back** the **subtrahend** or smaller number (keep track on my fingers)

Step 3: Record the **difference**

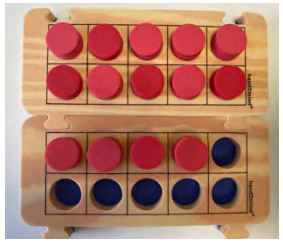
15 – 6 = 9

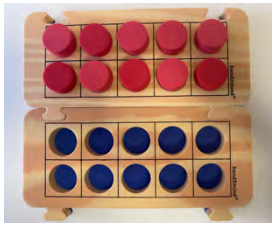
Subtract two digit and one digit by crossing ten (subtracting through 10)

Children use a **20 frame** to support subtracting to **10** first and then subtracting the left over. This is done in steps through **partitioning** the **subtrahend** first.

14 – 6 =

Step 1: Place the Minuend on the 20 frame

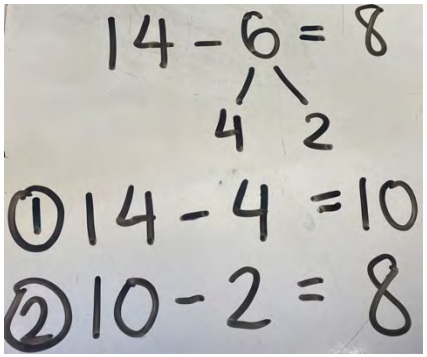


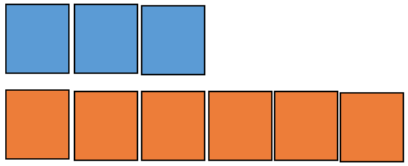


Step 2: Partition the **subtrahend** to get to 10.

Step 3: Subtract the leftover amount and record the difference

Children can use a pictorial 20 frame and cross out the **subtrahend** in two steps and then later move on to showing their steps in the abstract model, recording their subtraction **equations**.



Solve one step problems including missing number		
Children can use concrete and pictorial resources to find the **difference** by **counting on.** They can use the physical objects to count how many more or less there are to find the difference between them. **6 - ___ = 3**  The difference between ____ and ____ is ____.	 This then can be supported further by moving to a number line. Children can circle both numbers provided in the equation and **count on** how many more to get to one from the other. **13 - ____ = 8** Pupils can be supported to rewrite the number sentence using the **inverse** to support counting on. **8 + ____ = 13**	Pupils can be supported by rewriting the number sentence to use the **inverse** of **subtraction** to solve. Only when pupils are ready for this. **13 - ___ = 8** **8 + ___ = 13** With some greater depth pupils you may have the children to rewrite **13 - ___ = 8** as **13 – 8 =** ____ in a supported context as well.

Year Two Subtraction

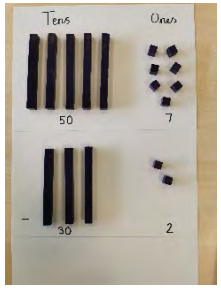
KPIs

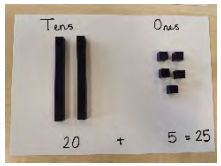
- subtract two-digit numbers and ones, and two-digit numbers and tens, where no regrouping is required, explaining their method verbally, in pictures or using apparatus (e.g. 23 + 5; 46 + 20; 16 – 5; 88 – 30)
- show that subtraction is not commutative as addition is
- recognise the use of inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Subtracting two two-digit numbers (no regrouping)

Use of dienes to **subtract.**
Subtract the **ones** first then the **tens.**
(Minuend-subtrahend= difference)

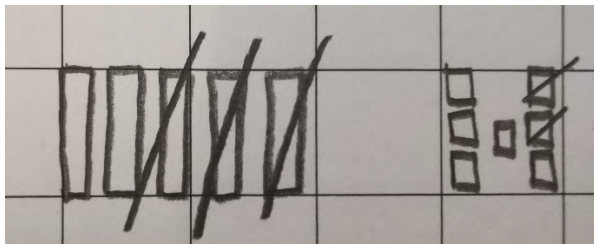
57 – 32 = 25





Use of children's drawings of dienes/images of dienes to support understanding- children will physically cross out.

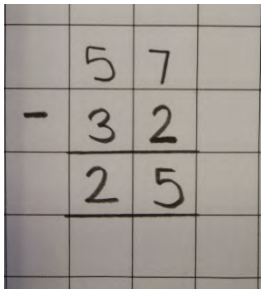
57 – 32 = 25



Use of the column method to **subtract**

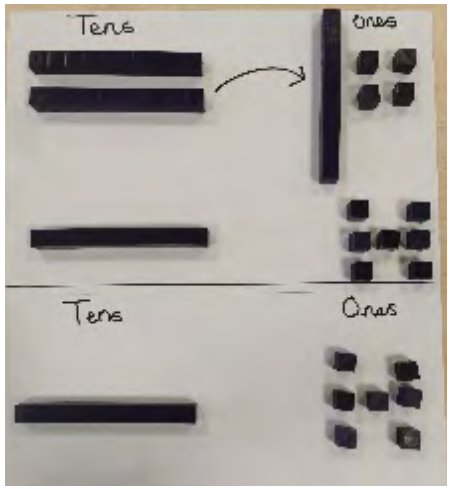
57 – 32 = 25

- Arrange in a column
- **Subtract** the **ones**
- **Subtract** the tens
- Record your answer



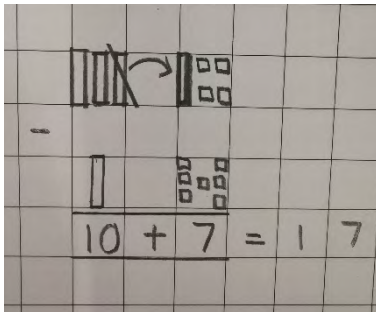
Subtracting two two-digit numbers (regrouping)

Use of dienes to **subtract**.



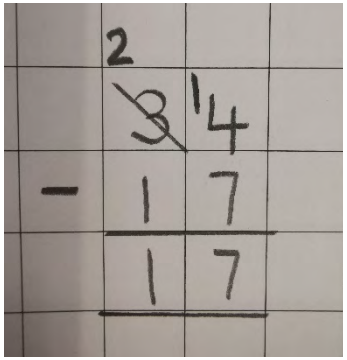
Use of children's drawings to support understanding.

37 – 17 = 17



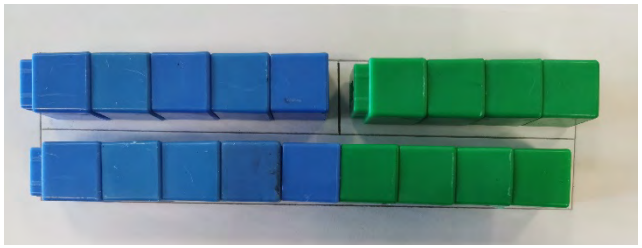
More abstract representation utilised alongside mathematical addition statements.

Use column method to **subtract.**



Using inverse

Children use a bar model to support understanding that addition is commutative (can be done in any order) but **subtraction** is not.



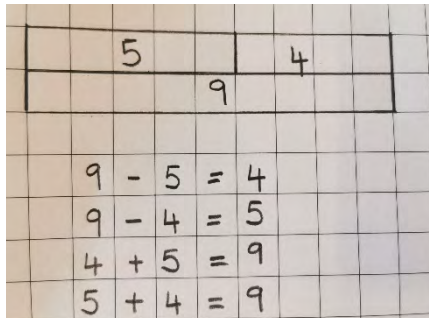
5 + 4 = 9
4 + 5 = 9
9 – 5 = 4
9 – 4 = 5

Children use knowledge of **subtraction** sentences to say related addition facts.

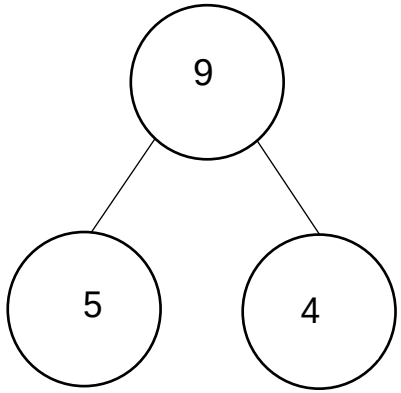
If I know that …

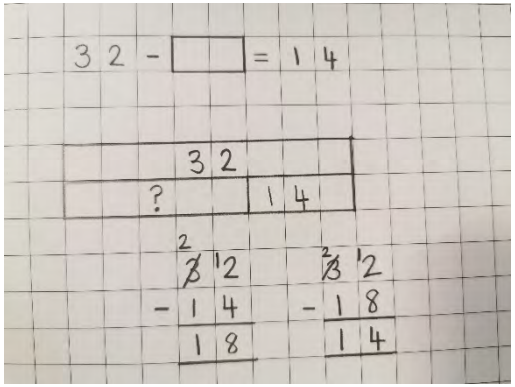
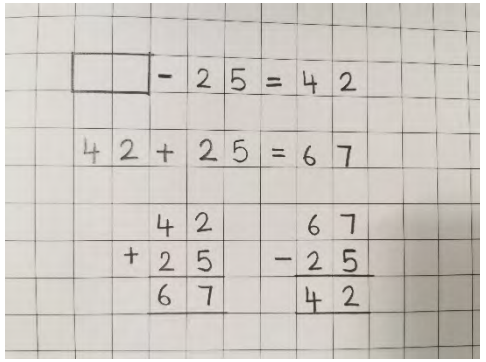
4 + 5 = 9 then I also know…

9 – 5 = 4 etc



Children use a part whole model to support understanding of **subtraction.**



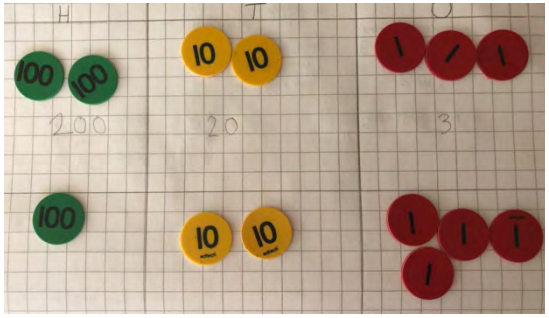
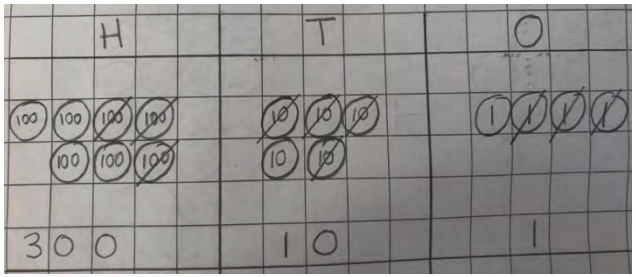
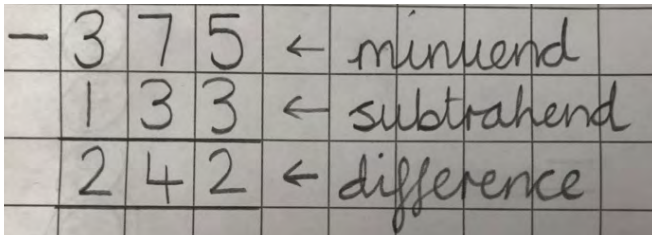
Solve one step problems, including missing number		
Children can use concrete and pictorial resources to find the **difference** by **counting on.** They can use the physical objects to count how many more or less there are to find the difference between them. **25 - ___ = 14**  The **difference** between 25 and 14 is 11.	Use known methods such as bar model to solve missing number problems. 	Children should understand **commutativity** of **addition** when using **inverse**. _____ - 25 = 42 

Year Three Subtraction

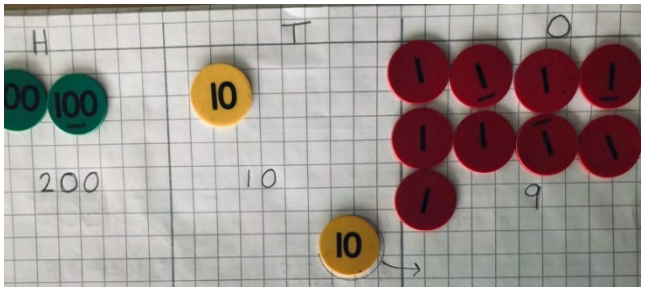
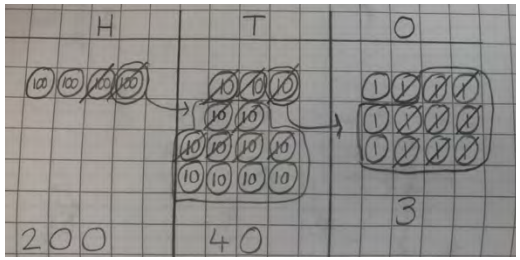
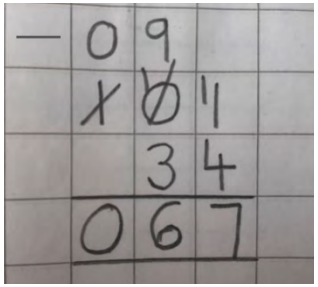
KPIs

- Subtract numbers with up to 3 digits, using formal column method
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place

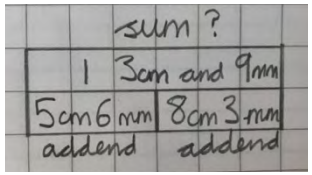
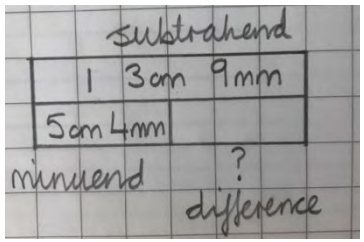
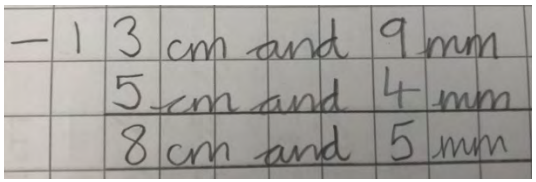
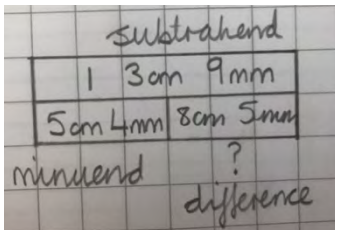
Subtracting 3-digit numbers (No regrouping)

Use of either concrete **place value counters** and **dienes** to support subtraction (physically take away the counters from the subtrahend). **347 – 124 = 223** 	Supporting the calculation **pictorially** by drawing counters then crossing out the minuend out to represent taking away. **754 – 343 = 411** 	Abstract representation through the formal **column** method. **375 - 133 = 242** 

Subtraction with regrouping (regrouping more than once)

Use of either concrete **place value counters** and **dienes** to support subtraction (physically take away the counters from the subtrahend) **367 – 148 = 219** 	Supporting the calculation pictorially by drawing counters showing the regrouping into the next column. 432 – 189 = 243 	Formal **column** method with regrouping shown at the **top** **101 – 34 = 67** 

Word Problem

Read the problem, underlining the **key information.** A candy shoelace is 5cm and 6mm long. Another one is 8cm and 3mm long. What is their **total length**? Harvey **eats** 5cm and 4mm. How long will they be now? Identify the number sentences required. Fill in the bar model with known information.	Draw the bar model for the first part of the problem. 5cm **and** 6mm + 8cm **and** 3mm = 13cm **and** 9mm  	Final column method /final bar model with answer 13cm **and** 9mm – 5cm **and** 4mm =  

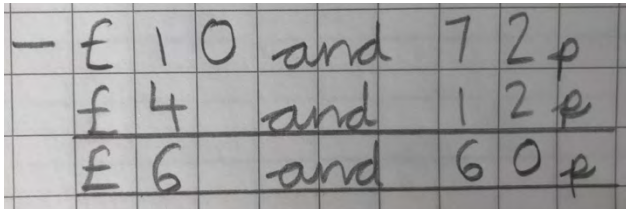
Subtracting money with 'and'

Subtracting money concretely without regrouping (subtract the pounds then pence)

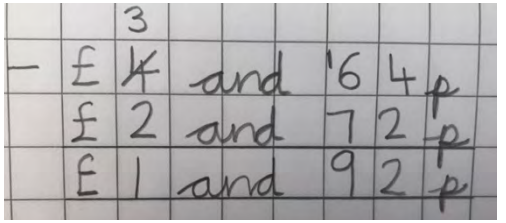
£15 **and** 50p - £5 **and** 20p = £10 **and** 30p

Subtracting money using the **column** method **(without regrouping)**

Not using decimal place in formal method.



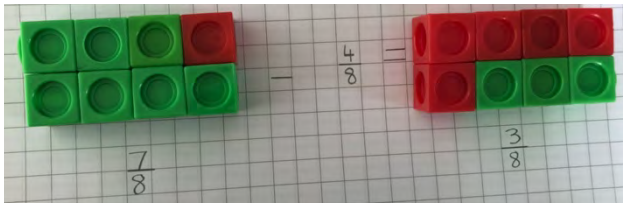
Subtracting money using the **column** method **(with regrouping)**



Subtracting fractions

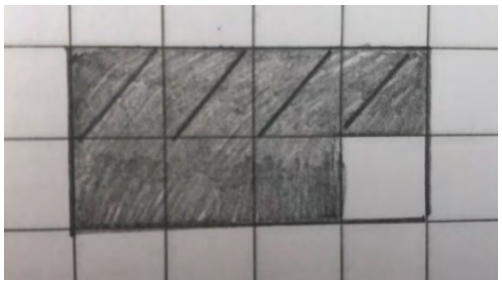
Concrete materials to represent that when subtracting fractions with the same denominator the whole will stay the same. The numerator is changing.

7/8-4/8 = 3/8

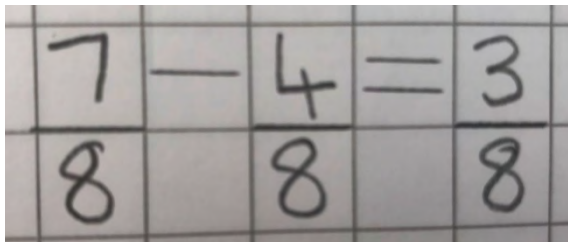


Pictorial representation shows subtracting 4/8 from 7/8. Crossing out to representing subtracting the minuend.

7/8-4/8 = 3/8



Abstract representation in a number sentence.

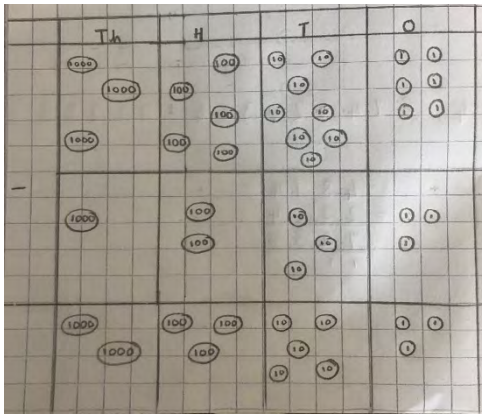
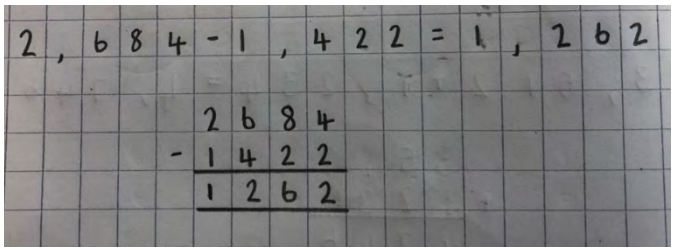


Year Four Subtraction

KPIs

- Subtract numbers with up to 4 digits using the formal written methods of column subtraction where appropriate
- Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.
- Subtract fractions with the same denominator
- Subtract fractions with the different denominator

Subtracting 4-digit numbers no regrouping

Concrete (using **place value counters**)	**Pictorial** (drawing place value counters)	**Formal** (using the column method)
2,684-1,422=1,262	**2,684-1,422=1,262**	When writing the number sentence, children will be taught to use a **comma after the thousand**
		

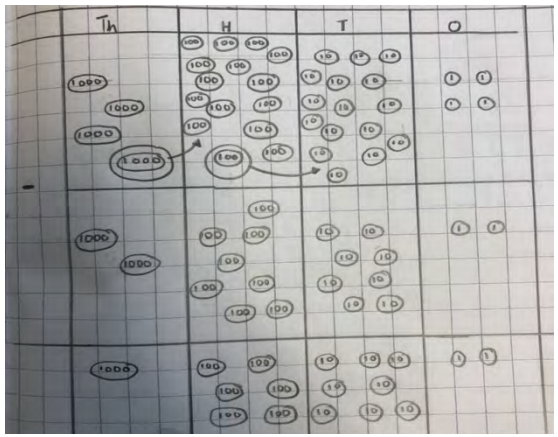
Subtracting 4-digit numbers with regrouping

Concrete (using **place value counters**)

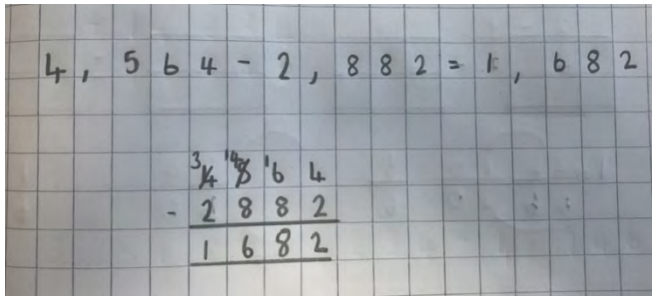
4,564-2,882=1,682

Pictorial (drawing place value counters)

4,564-2,882=1,682



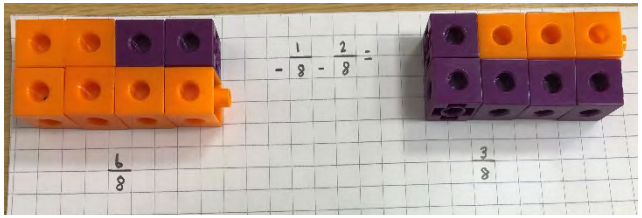
Formal (using the column method)
When writing the number sentence, children will be taught to use a **comma after the thousand**



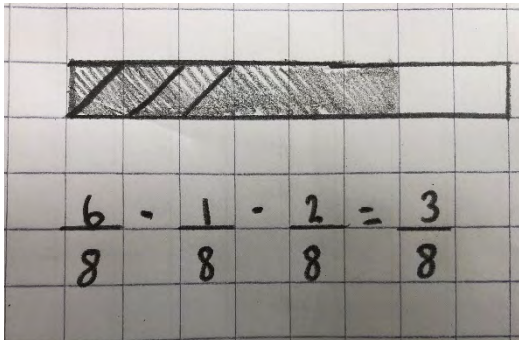
Subtracting 2 or more fractions with the same denominator

Concrete representation of **subtracting fractions** (cubes)

6/8- 1/8 -2/8 = 3/8



Pictorial representation using shape.



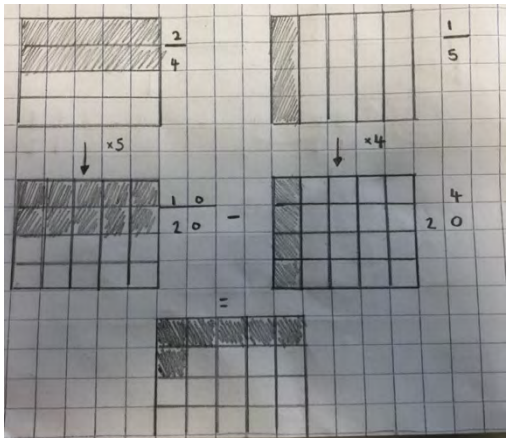
Abstract representation of subtracting fractions.

Subtracting fractions with different denominators in word problems

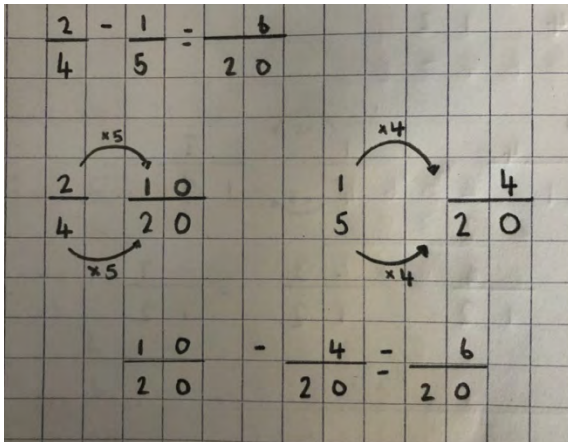
Remember to find the **key information** in the word problem

Jamie had two quarters left of a chocolate cake. Melanie eats **one fifth** of the cake. How much is l**eft**?

Pictorially subtracting fractions with a different denominator.

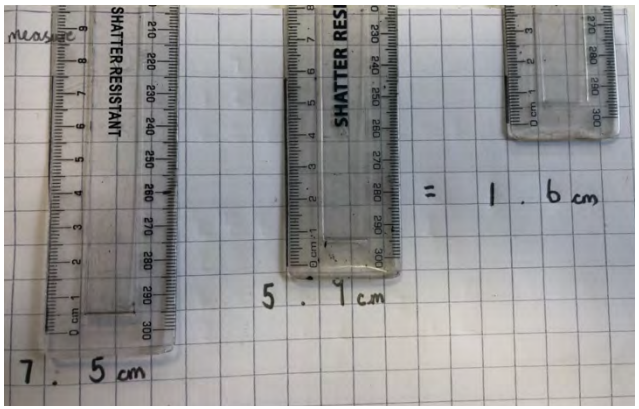


Abstract subtracting fractions with fractions with a different denominator

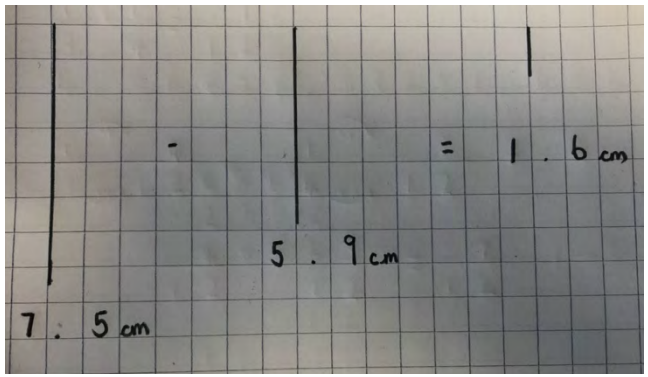


Subtracting with decimals

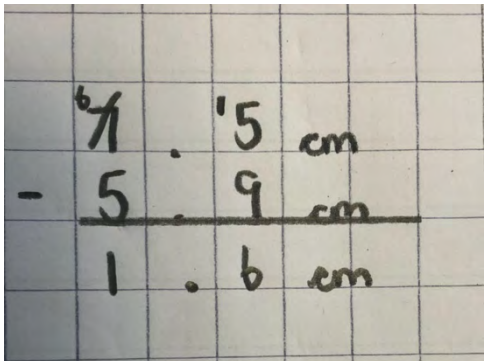
Concrete with resources. The children can measure the different amounts to find the **difference**



Pictorially



Abstract using the column method



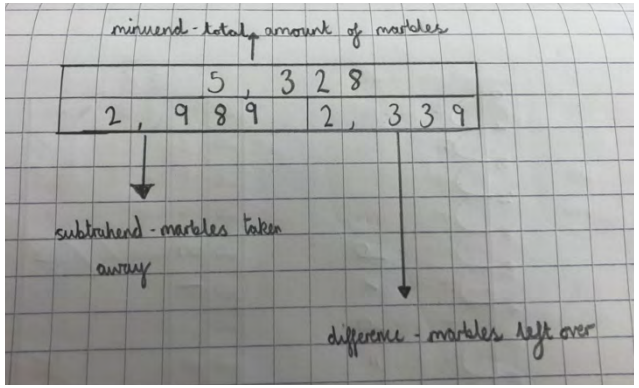
Word problems, bar model and part part whole in subtraction

Remember to find the **key information** in the word problem.

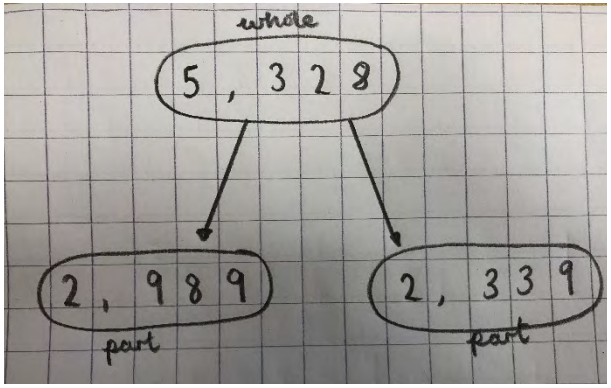
Eliza had **5,328** marbles. Jonah **took 2,989** marbles from her. How many marbles were **left over**?

5,328 (minuend)- 2,989 (subtrahend)= 2,339 (difference)

Bar model:



Part-part whole model:



Year Five Subtraction

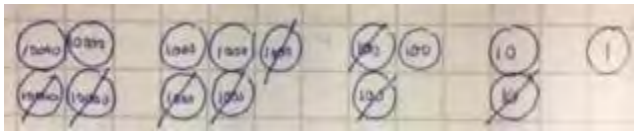
KPIs

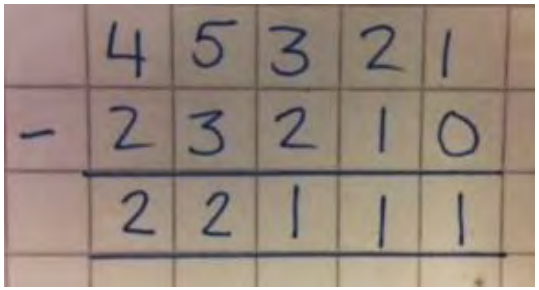
Children will be taught to:

- Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) – solve multi-step problems
- Add and subtract fractions with the same denominators and with denominators with the same multiples

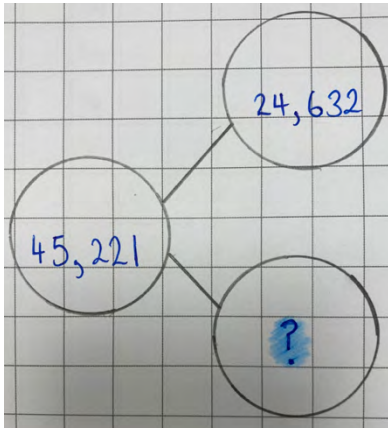
Column subtraction with regrouping

Before using the **column subtraction** method, children should use place value counters to explore the calculation.

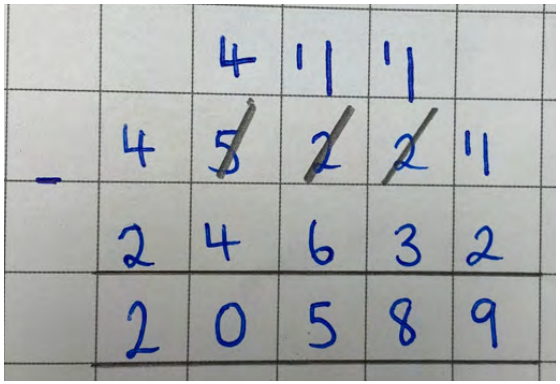




Children will also use the **part-whole model** to represent the relationship between the numbers and the inverse calculations.

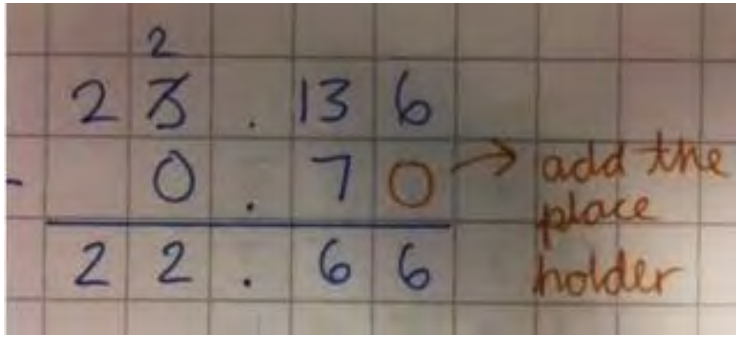


When **regrouping**, children should denote the new digit above the old, as shown below. Children will solve calculations that involves multiple regrouping.



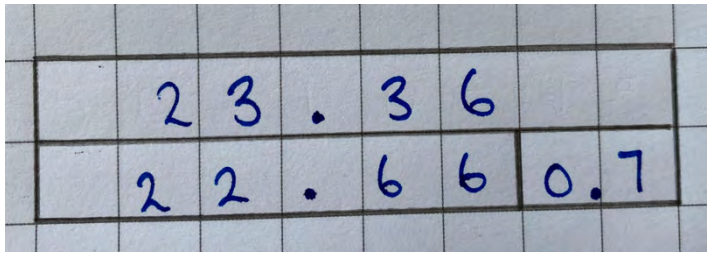
Column subtraction with decimals

When subtracting using decimals, children should add **place holders** to ensure that the numbers have the same number of decimal places.



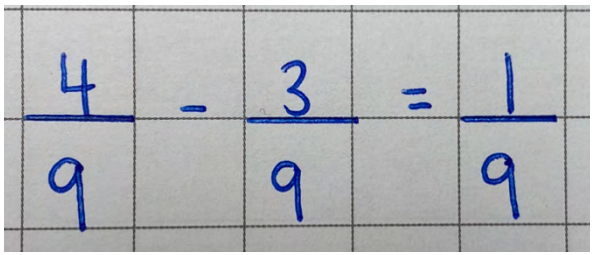
It is important that children recognise that they are subtracting **tenths** and **hundredths** and that they understand they are subtracting part of a number not a whole number. They may also use place value counters to explore how the digits change when subtracting.

The **bar model** can also be used to represent the relationship between numbers and to develop an understanding of the calculations that can be used to find a 'missing number'.

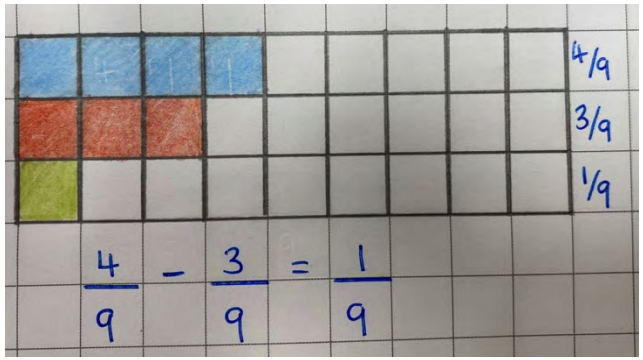


Subtracting fractions with the same denominator

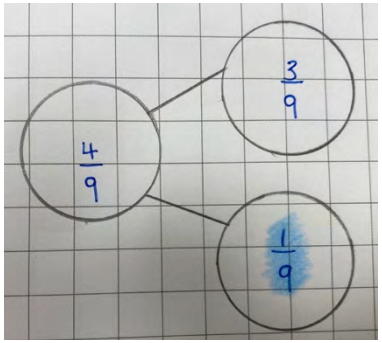
Children should understand that fractions with the same denominator are **parts** of a **whole** and **to subtract** them, only the **numerators change**.



Children should use the **bar model** representation to show this visually and to aid understanding. The children can also use this representation to aid questions with missing boxes.

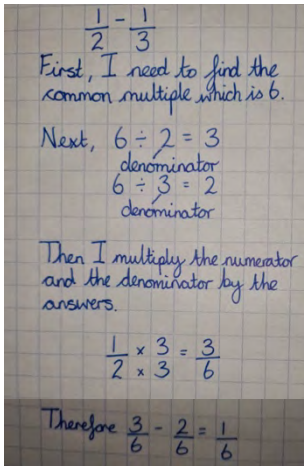


This relationship can also be represented using the **part – whole** model and can also be used to find missing values.

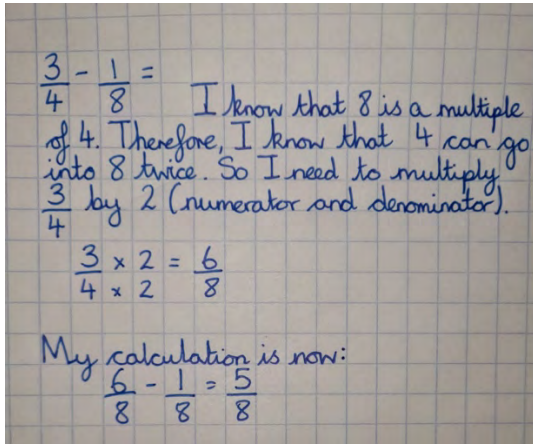


Subtracting fractions with different denominators

When adding fractions with different **denominators**, children must first be taught how to find the **common denominators**.

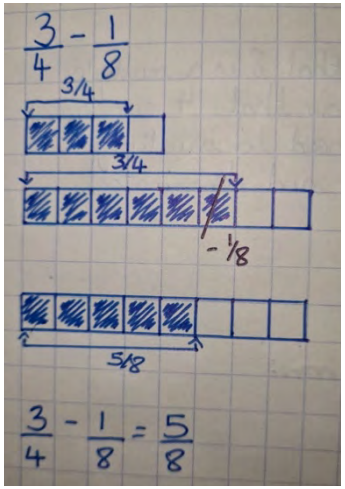


Children should be taught to look out for **common multiples** where possible.



Bar Model

Bar model should be used to show fractions visually and aid understanding. This can be used to help find **equivalent fractions** and to aid the **addition of fractions**.



Year Six Subtraction

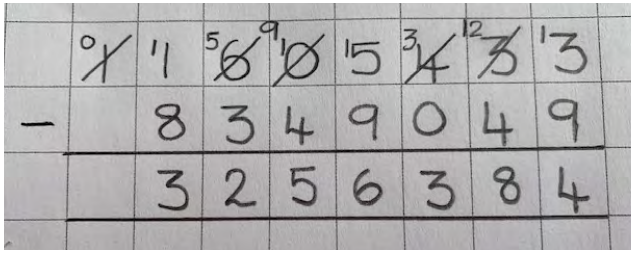
KPIs

Children will be taught to:

- Use column method for bigger numbers and decimal numbers up to 3 decimal places
- Subtract fractions with different denominators and mixed numbers

Column subtraction with regrouping

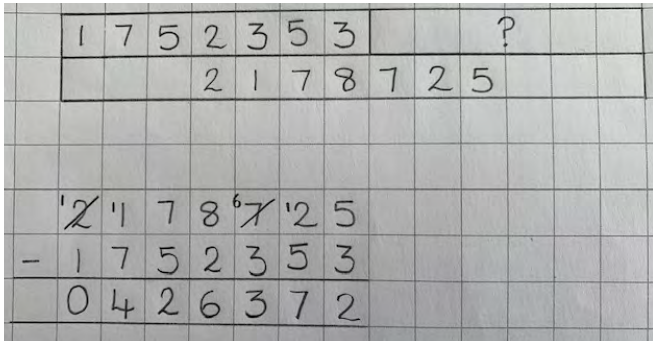
Children should use column subtraction when adding numbers with 4 or more digits. Regrouping should be used where calculations cross ten and should be denoted under the calculation line.



Bar Model

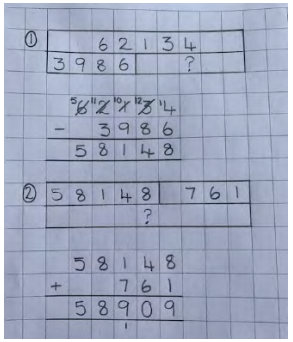
Children use a bar model to visually represent the problem.

A business bank account has £2,178,725 originally but spends £1,752,353. How much is left in the account?



Multistep Bar Model

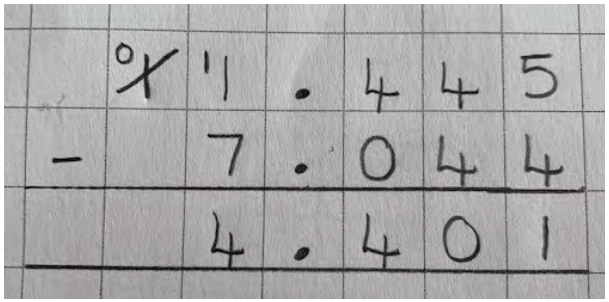
The Iron Swords Company employed 62,134 men, however then the industry experienced a decline and 3,986 men left. However, business began to improve and they employed another 761 men. How many men work at the Iron Swords Company now?



Column subtraction with decimals

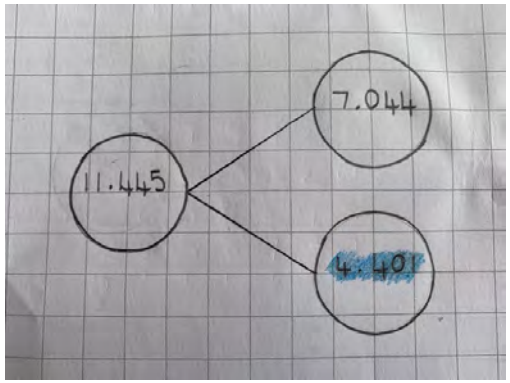
Recap Y5 decimal subtraction

11.445 – 7.044 = 4.401



Part Whole Model

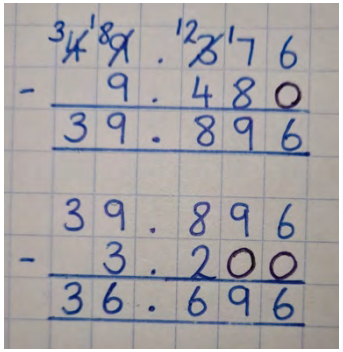
Part – whole model shows the relationship between numbers.



Recap Y5 decimal subtraction with 0 as a place value holder

49.376-9.48-3.2 =

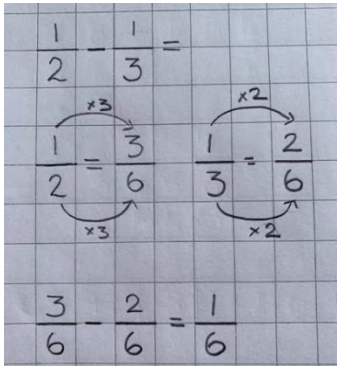
Zero used as a place holder so all decimals have the same number of decimal places.



Subtracting fractions with different denominators

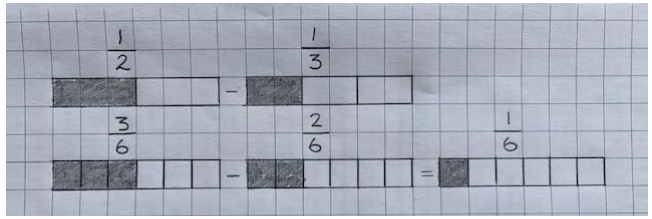
Children should recap skills from Y5 subtracting fractions

Subtracting fractions of different denominators. Find the common multiple and the quotient needs to be then multiplied by both the numerator and denominator.



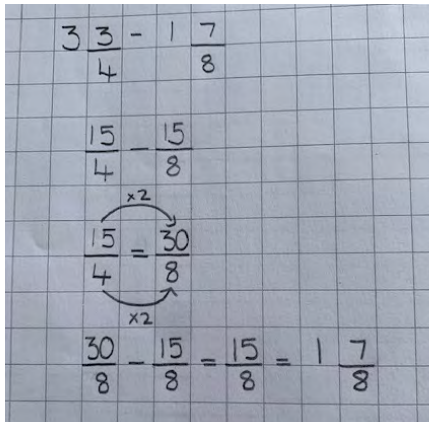
Bar model

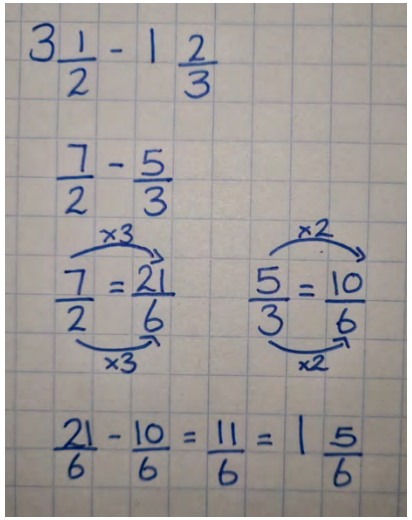
Bar model make sure that your bar model represents the equivalent fraction that is being represented.



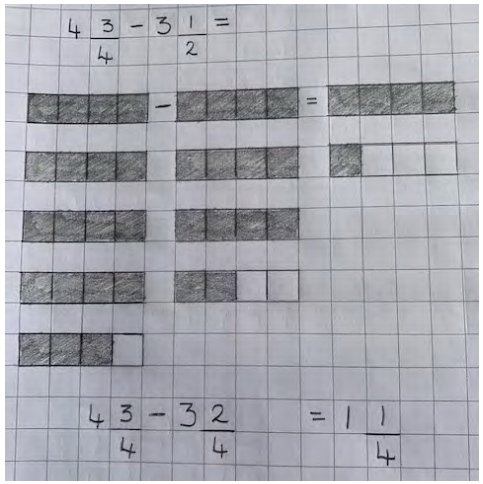
Subtracting fractions including mixed numbers

Adding mixed fraction add the whole numbers then find the common multiple then multiply the quotient by the numerator and denominator.





Bar Model



Early Years Multiplication

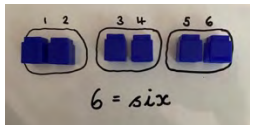
KPIs

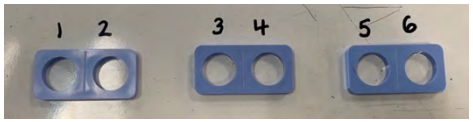
Pupils should be able to:

- Solve problems involving doubling

Making equal groups

Use of everyday objects, cubes and counters to put them into **equal groups** and then counting on in ones.





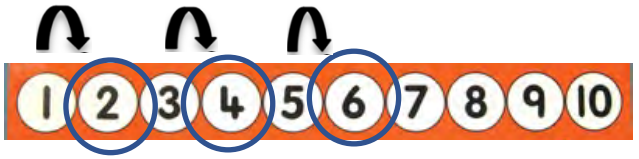
If children are secure could write as
2 + 2 + 2

Use of pictorial representations to make **equal groups**.

How many ***groups*** of two have you made?

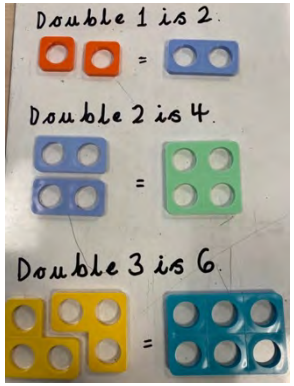
Use of a number track and a counter or whiteboard pen as a visual to count on in ones but emphasizing the multiples.

1 **2** 3 **4** 5 **6**



Children will use the number line as a visual not as a method of making equal groups.

Doubling

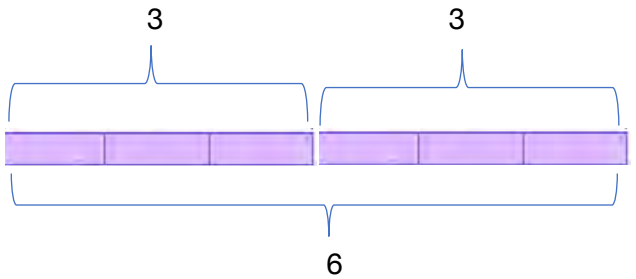


Use of numicon to **double** numbers. If children know the shape of the numbers, then it'll be easier for them to recall their **double** facts.

Use of multi-link cubes to double a number. Children can see the two parts are the same size and then put them together to **double.**

Double

Encouraging children to recognise:
Double 3 is 6 is the same as 3 + 3 = 6



Year One Multiplication

KPIs

- Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Count in multiples

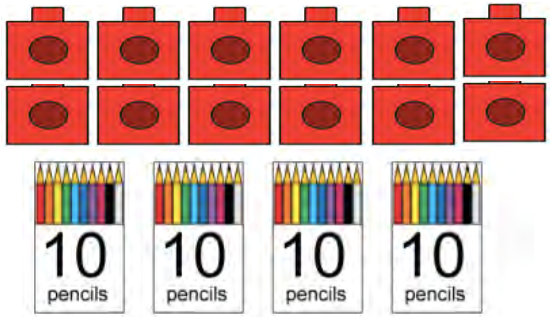
Use of practical apparatus and everyday objects to group and **count** in **multiples** of 2**, 5** and **10.** The idea of **unitising** or understanding that one objects can represent more than one thing is essential.

Language focus

"Ten, twenty, thirty…"

"1 group of 10, 2 groups of 10, 3 groups of 10…"
In time, shortened to:
"1 ten, 2 tens, 3 tens…"

Use of pictorials to support **counting** on in multiples. May also be drawn by the pupil



Children will use a hundred square or a number line to help support them in counting on and back in steps of 2, 5 and 10.

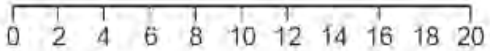
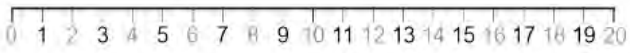


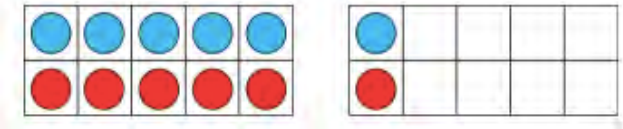
Figure 10: number line to support counting in multiples of 2

Some pupils may be able to recite the odd numbers in steps of 2 if they are secure in counting in the even steps of 2



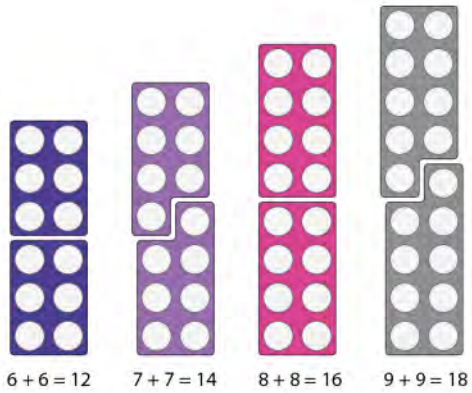
Doubling

Use of a tens frame to support understanding that **doubling** is **adding** the same number to itself.

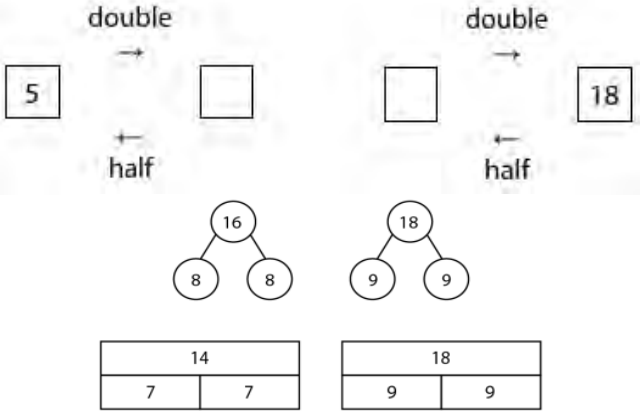


Pupils can also use cubes in towers to represent as well as numicon as seen in EYFS policy. Year 1 pupils should be able to double numbers to 10.

Pupils can look for patterns and explore. We would want year 1 pupils to see that doubling **a whole** number always makes an **even** number.

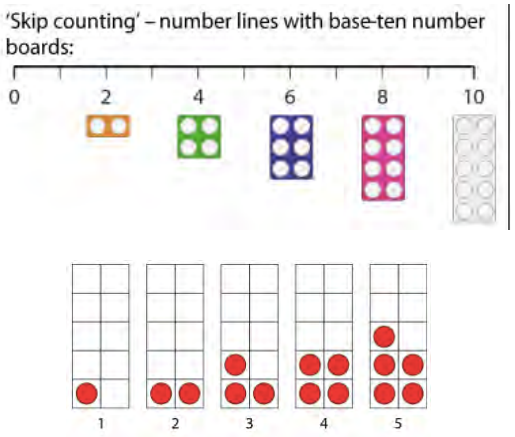


Use of abstract models to assess pupils recall of **doubles** to 10.

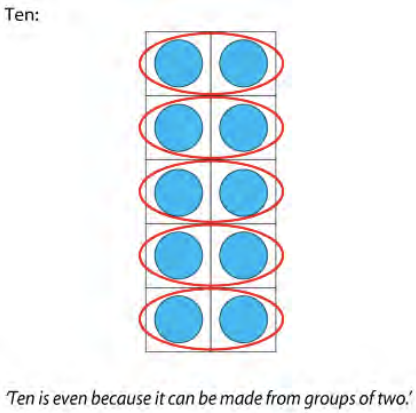


Odd and Even Numbers

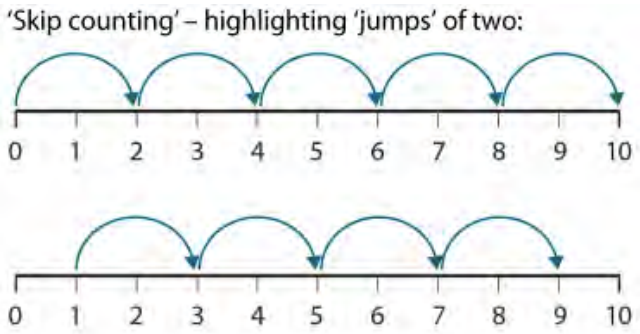
Children should learn to recognise **odd** and **even** numbers, up to 10, based on whether they can be composed of **groups of** 2 or not.



Children use pictorials to continue to support understanding of **even** numbers being able to be grouped into pairs and **odd** numbers cannot.

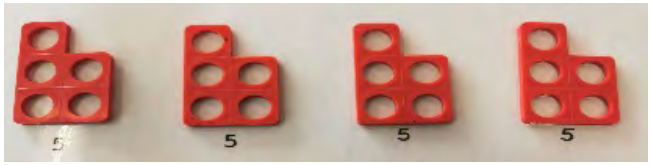


More abstract tools such as a number line can be utilised to support this understanding.



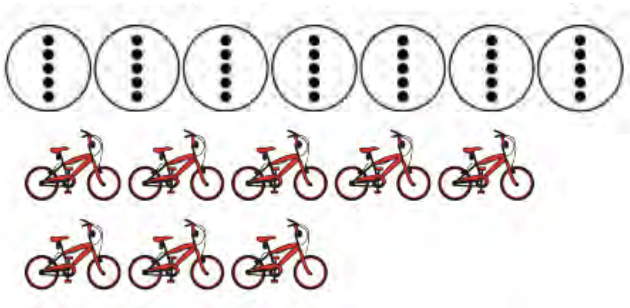
Repeated Addition

Children use concrete resources to understand **multiplication** as **addition.**



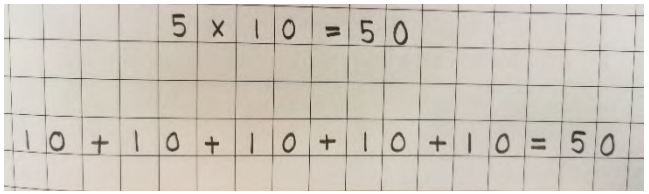
5 + 5 + 5 + 5 = 20
4 x 5 = 20
4 groups of 5 is 2

Children use pictorials to understand **multiplication** as **repeated addition.**



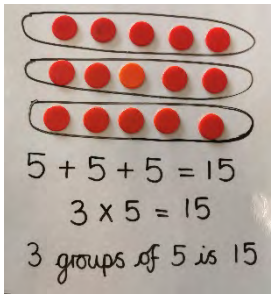
There are 8 bicycles.
Each have 2 wheels.
8 groups of 2 are 16.

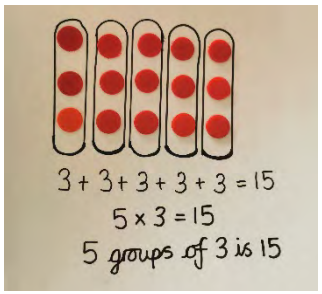
Use of abstract to understand **multiplication** as **repeated addition**.



Arrays

Using practical resources such as counters or cubes to support solving **multiplication** problems using arrays.





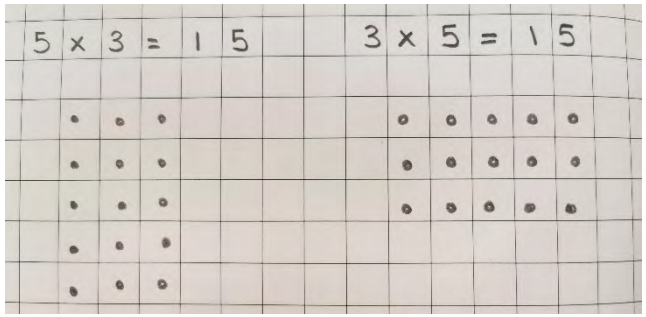
Example of commutative relationship.

Use of pictorials to support solving **multiplication** problems using arrays.

3 x 2 = 6

2 x 3 = 6

Children can draw an **array** as a method to solve problems.



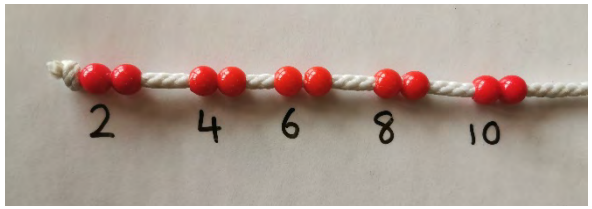
Year Two Multiplication

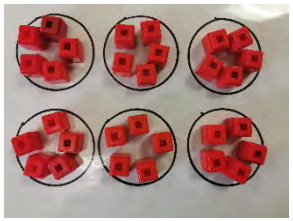
KPIs

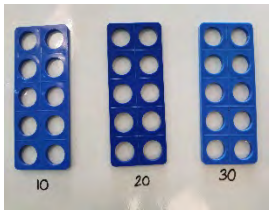
- Can recall and use multiplication facts for the 2, 5 and 10 multiplication tables to solve simple problems, demonstrating an understanding of commutativity as necessary (e.g. knowing they can make 7 groups of 5 from 35 blocks.

Count in multiples

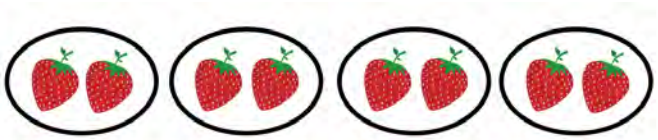
Use of practical apparatus to support **counting** in **multiples** of **2, 5** and **10.**





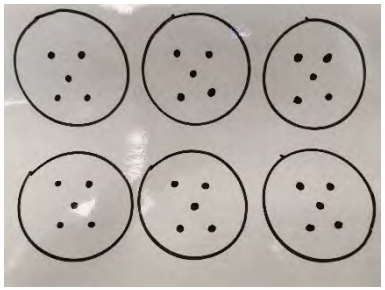


Use of pictorials to support **counting** on in **multiples.**



8
Eight
4 groups of 2 is 8

Children drawing **groups in** books to solve **multiplication.**

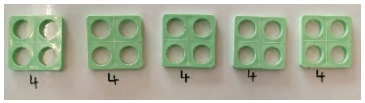


30
Thirty
6 x 5 = 30
6 groups of 5 is 30

Repeated addition

Children use concrete resources to understand **multiplication** as **addition.**

5 + 5 + 5 + 5 = 20
4 x 5 = 20
4 groups of 5 is 2



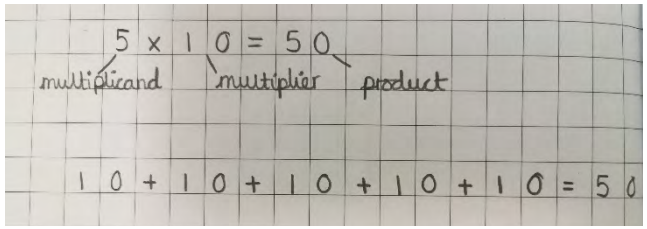
4 + 4 + 4 + 4 + 4 = 20
5 x 4 = 20
5 groups of 4

Children use pictorials to understand **multiplication.**

2 + 2 + 2 = 6
3 x 2 = 6
3 groups of 2 is 6

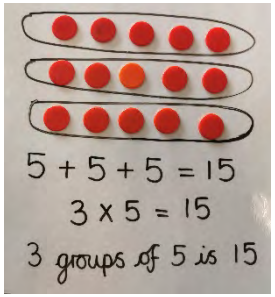
3 + 3 = 6
2 x 3 = 6
2 groups of 3 is 6

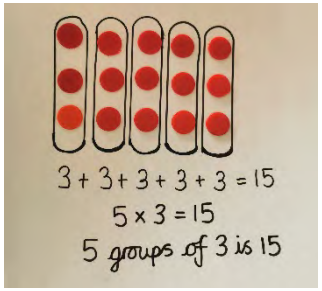
Use of abstract to understand multiplication as repeated addition.



Arrays

Using practical resources such as counters or cubes to support solving **multiplication** problems using arrays.





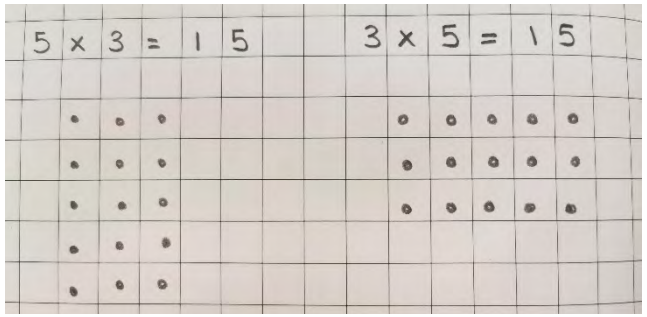
Example of commutative relationship.

Use of pictorials to support solving **multiplication** problems using arrays.

3 x 5 = 15

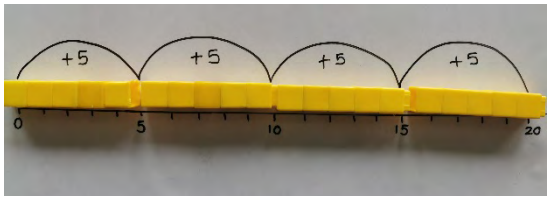
5 x 3= 15

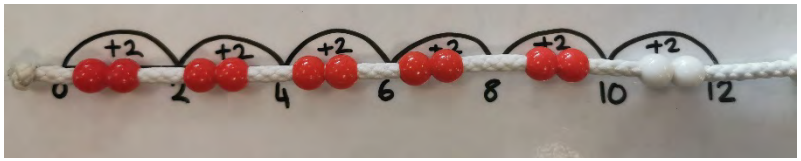
Children can draw an **array** as a method to solve problems.



Number line

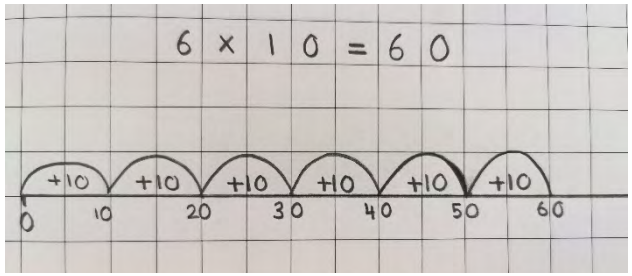
Children can use cubes or beads to support their understanding of using an empty number line to solve multiplication problems.





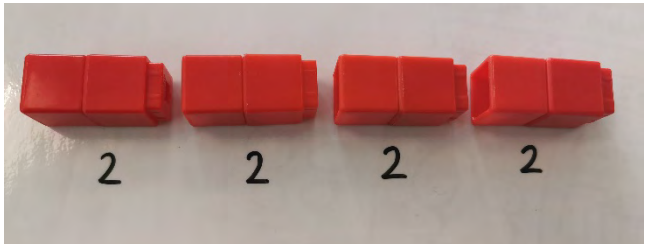
Children can move on to solving more abstractly through an empty number line to solve **multiplication** problems.

- Start at 0
- Count on in the multiple
- Write the total amount

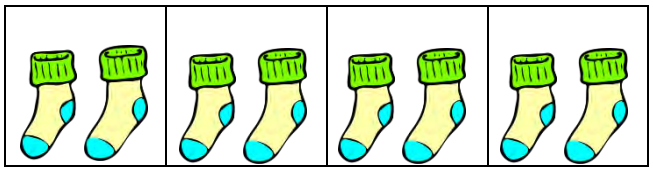


Bar model

Children can use practical resources such as cubes to solve using a bar model.

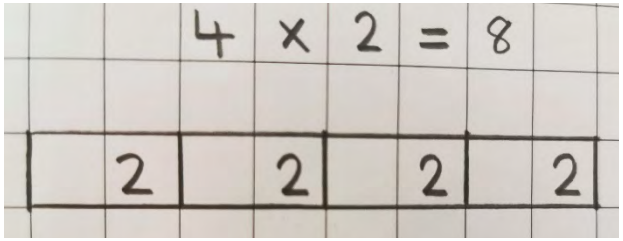


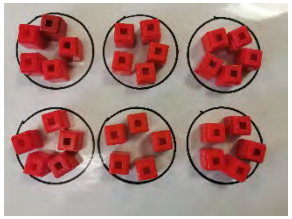
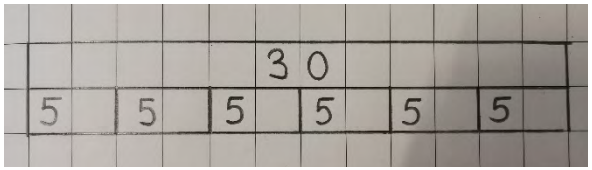
Children use pictorial representation to solve **multiplication** using bar model.



8
Eight
4 x 2= 8
4 groups of 2 is 8

Children moving onto abstract by drawing their own bars to solve **multiplication** problems.



Solving problems in context		
children should have experience using different methods to solve word problems as well as choosing the most efficient method for the problem. Rosie bought 6 boxes of marbles. There are 5 marbles in each box. How many marbles does Rosie have in total? 	Solving word problem using pictorial. 	Solving word problem in context using bar model representation. Abstract 

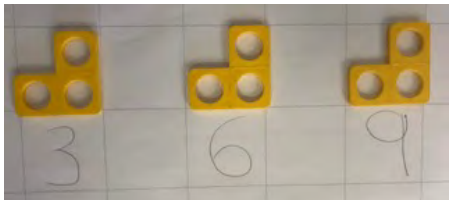
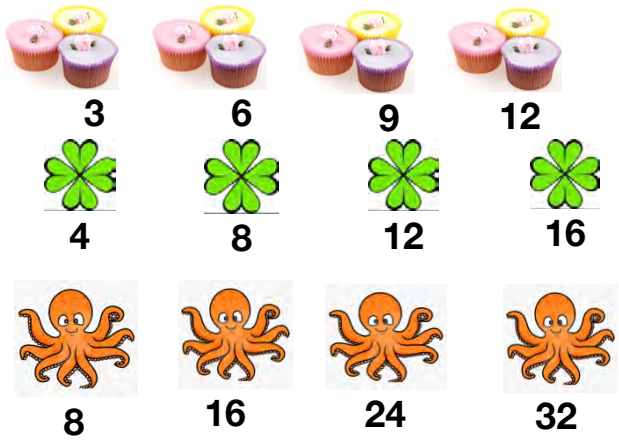
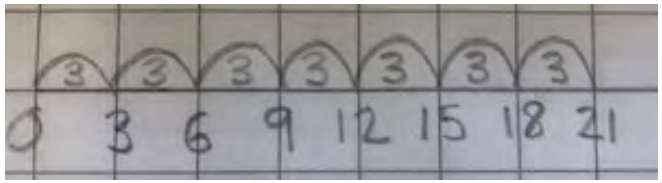
Year Three Multiplication

KPIs

Pupils should be taught to…

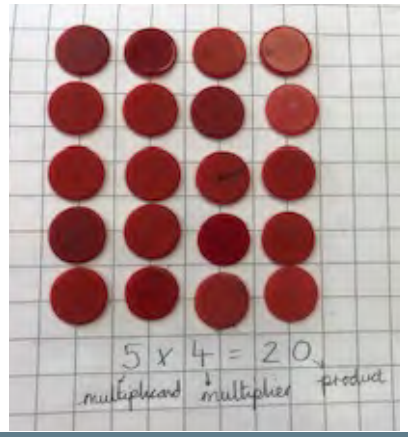
- Recall and use multiplication and division facts for the 3, 4 and multiplication tables
- Write and calculate multiplication statements using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- Solve problems, including missing number problems

Count in multiples

Step count in multiples using **concrete resources** such as **numicon** or **unifix**	Step count in multiples using **pictorial images** from **real life relatable contexts**	Step count in multiples using **a number line (could still be alongside the concrete/pictorial)**
 		

Multiplication sentences

Show the product to the multiplication sentence using **concrete resources** such as **numicon** or **unifix or through an array**



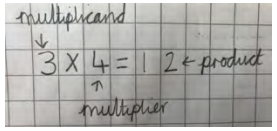
Show the product of the multiplication sentence using **pictorial images** from a **real-life context.**

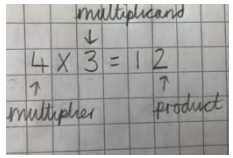
5 x 2 = 10

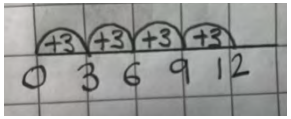
4 x 5 = 20

Show the product to the multiplication sentence using **a number line.**

The multiplicand can be either way around in the number sentence, as long as it represents the number that is being multiplied.







Bar model

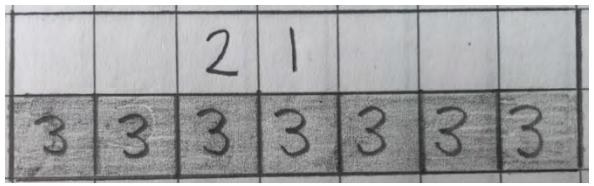
Use the concrete resource of **Cuisenaire** or **unifix** to represent the bar model.

5 x 2 = 10

2 x 4 = 8

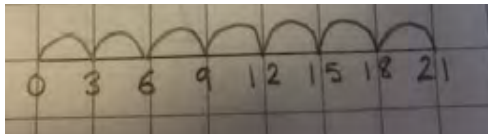
Draw the bar model and the bar will be in parts of the multiplier. The multiplicand will be shown in the parts.

7 x 3 = 21



Use the number line to show working out of the product.

7 x 3 = 21



Word problem

Read the problem, underlining the **key information.**

There were **6 packs** of eggs. **Each pack** had **4 eggs**. How many eggs are there in **total**?

Identify number sentence.
Represent the problem in a **bar model** using images or cuisenaire to support.

6 x 4 = ?

?					
4	**4**	**4**	**4**	**4**	**4**

Complete number sentence and answer in words.

6 x 4 = 24
4 x 6 = 24
4 + 4 + 4 + 4 + 4 + 4 = 24

24					
4	**4**	**4**	**4**	**4**	**4**

There are 24 eggs in total.

Word problems and scaling problems

Word problems with 2-digit numbers x 1-digit numbers.

Elm Tree's book shelf can fit **24 books**. There are **6 shelves**. **How many books** could the book shelf fit on it?

6 x 24 = 144

Elm Tree's bookshelf can fit 144 books on it.

Word problems with scaling up

Leo has **3 sweets**. Bo has **12 times more** sweets than Leo. **How many** sweets does Bo have?§

Bo	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Leo	**3**											

12 x 3 = 36

Bo has 36 sweets.

Word problems with combinations

William has 3 t-shirts and 4 pairs of trousers. How many different possibilities of outfits can he make?

Blue/LB	*Green/LB*	*Orange/LB*
Blue/DB	*Green/DB*	*Orange/DB*
Blue/O	*Green/O*	*Orange/O*
Blue/G	*Green/G*	*Orange/G*

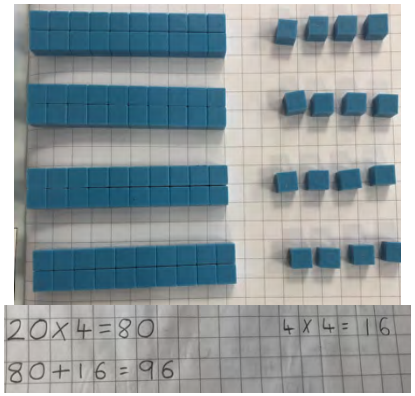
3 x 4 =

12

William can make 12 different outfits

Expanded short

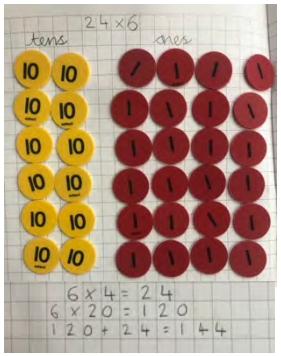
Use concrete materials such as **place value counters** or **base 10** to calculate a **two-digit number multiplied by a one-digit number.**

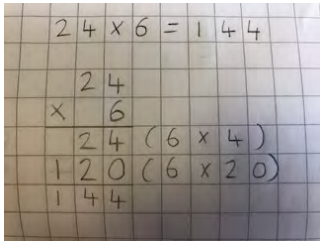


24 x 4 = 96

Use the **expanded short method** to multiply a two-digit number by a one-digit number

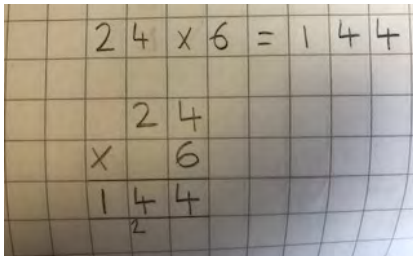
24 x 6 = 144





Once secure with the **expanded short**, use the **short method** to **multiply a two-digit number** by a **one-digit number**.

24 x 6 = 144



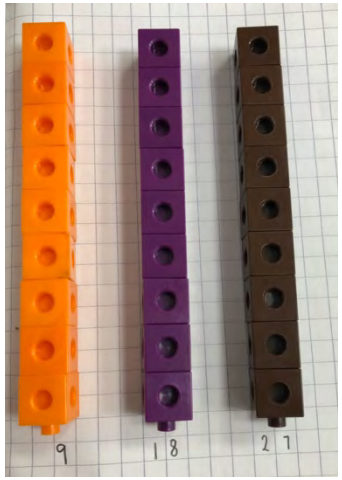
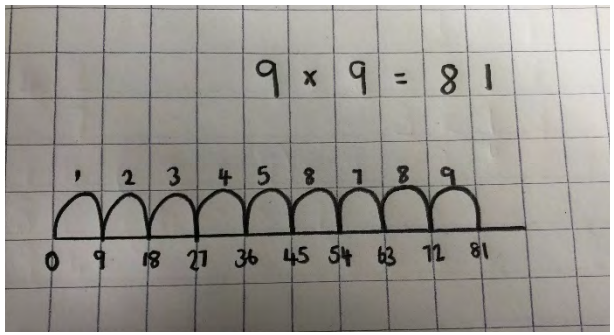
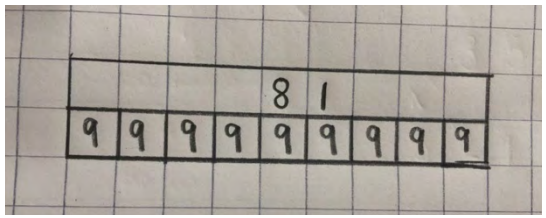
Year Four Multiplication

KPIs

Pupils should be taught to…

- Count in multiples of 6, 7, 9, 25 and 1000
- Multiply 2- and 3-digit numbers by 1-digit number using a formal written layout – see school calculation policy

Multiplication Sentences

Show the product to the multiplication sentence using **concrete resources**.  	Show the product to the multiplication sentence using a number line 9 x 9 = 81  	Draw the bar model and the bar will be in parts of the **multiplier**. The **multiplicand** will be shown in the parts. 9 **(multiplicand)** x 9 **(multiplier)** = 81 **(product)** 

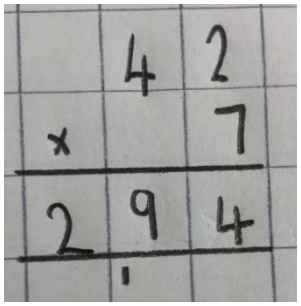
Formal method

Use the place value counters to show the multiplication number sentence.

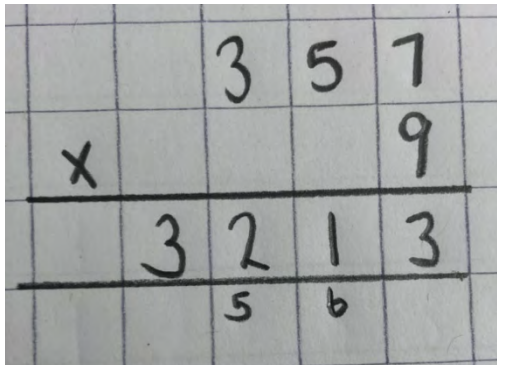
42 x 7 = 194

"refer to Y2 multiplication policy for further guidance"

Recap the expanded method to multiply a two-digit number by a one-digit number from year 3. Use the compact method to multiply a two-digit number by a one-digit number.



Use the **compact method** to multiply a three-digit number by a one-digit number.



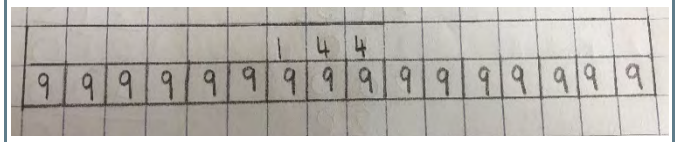
Word problems

Read the problem, underlining the **key information.**

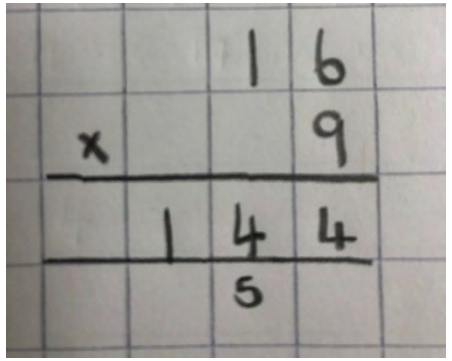
There were 1**6 packs** of cupcakes. **Each pack** had **9 cupcakes**. How many eggs are there in **total**?

Draw the **bar model** and the bar will be in parts of the multiplier. The multiplicand will be shown in the parts.

9 (multiplicand) x16 (multiplier)= 144 (product)



Use the **compact method** to multiply a two-digit number by a one-digit number



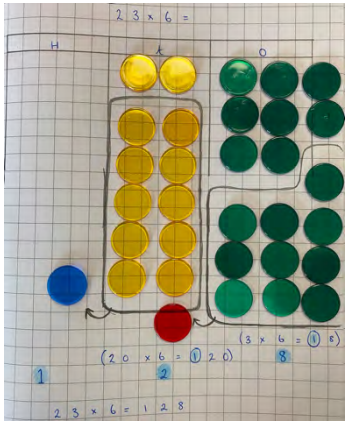
Year Five Multiplication

KPIs

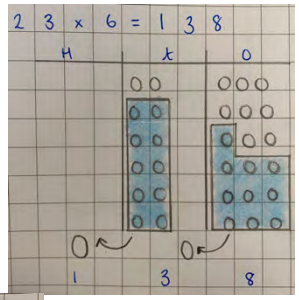
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates
- Multiply proper fractions and mixed numbers by whole numbers

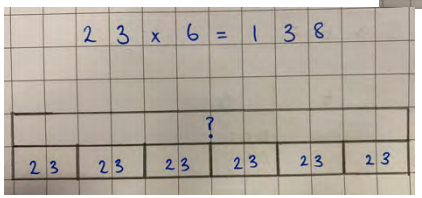
Short multiplication

Use of counters or place value counters to build conceptual understanding within **short multiplication.**

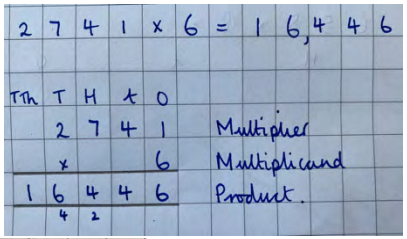


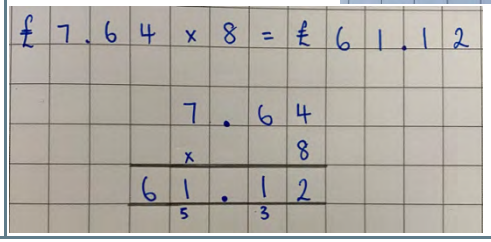
Use of pictorials to support short multiplication, including use of the **bar model.**





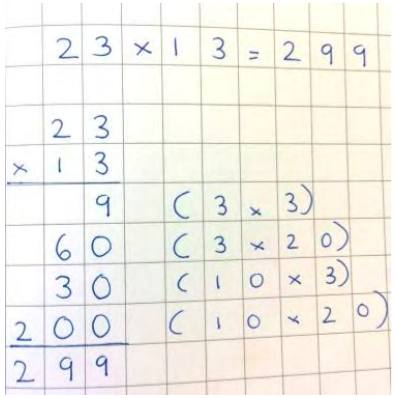
Abstract **short multiplication**, including decimals and other units of measure, where exchanges are noted under the calculation line.



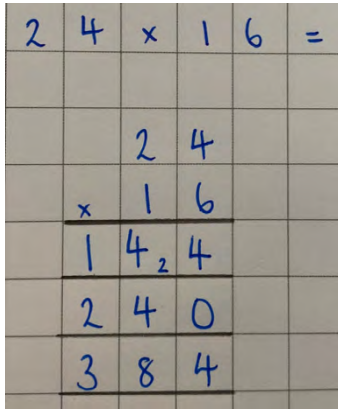


Long multiplication

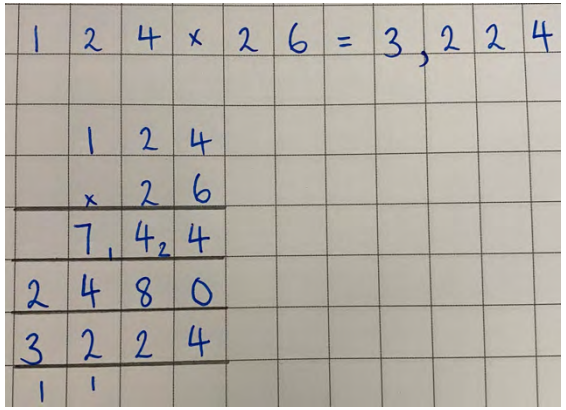
Children to explore the **expanded long** method if needed, otherwise they will use the **long multiplication** method.



Children will begin using **long multiplication** by multiplying a digit number by a 2-digit number.

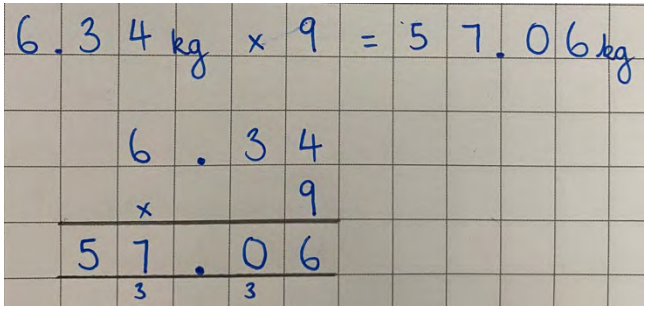


Children will then progress on to multiplying 3- and 4-digit numbers by 2-digit numbers.

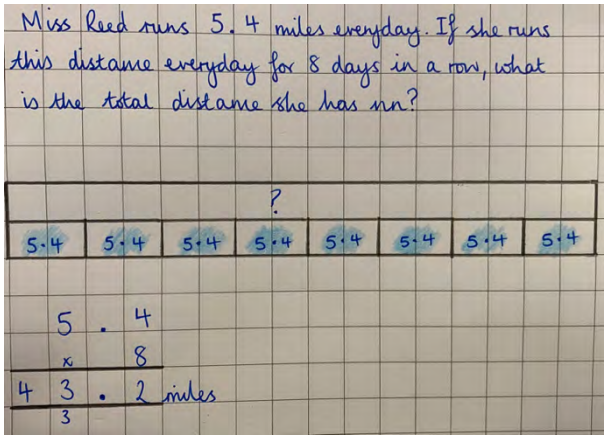


Decimals

Children will also learn to multiply decimals when they are in a range of units such as money or measures.

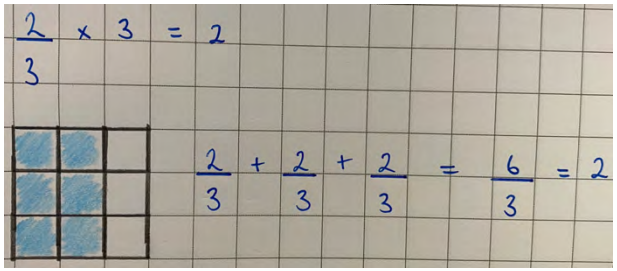


Children will use the **bar model** to visually represent word problems involving multiplication. They will use this representation to select an efficient method to solve the calculation.

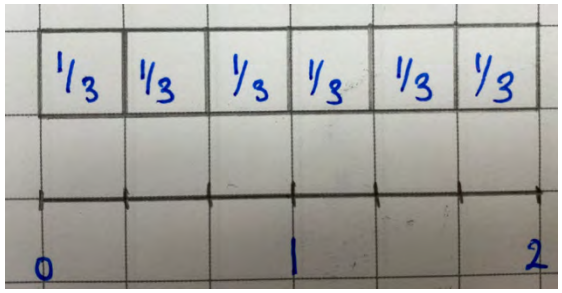


Fractions - multiplying by a whole number

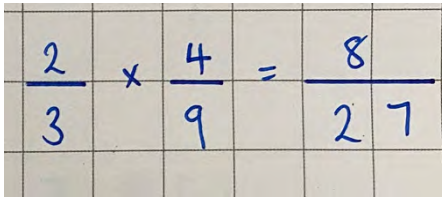
Children will use the **bar model** and **repeated addition** to multiply a fraction by a whole number.

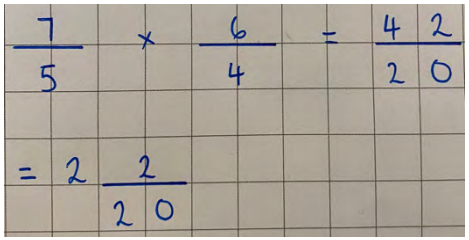


Children will also be able to represent the multiplication through repeated addition, using a **number line.**



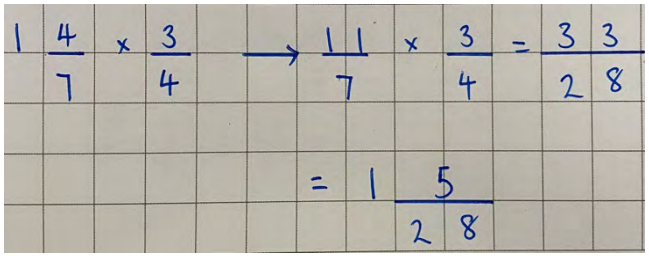
Children will use an abstract method to multiply 2 fractions with different **denominators.**



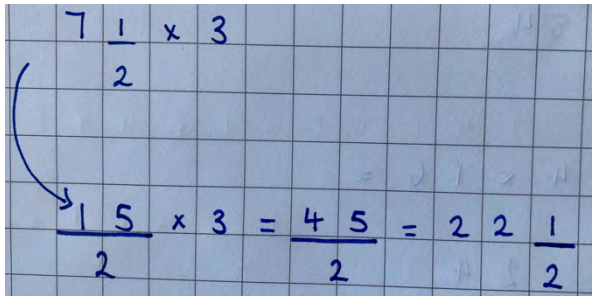


Fractions – multiplying with mixed numbers

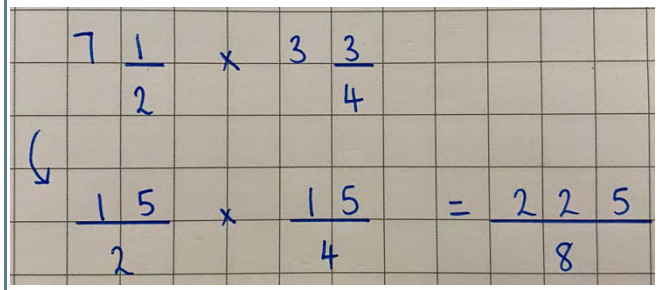
Children will also use an abstract method to multiply **mixed numbers** with fractions.



Children will also use an abstract method to multiply a **mixed number** by a whole number.



They will also progress on to multiplying mixed numbers together and where possible, will **simplify** the fraction further.



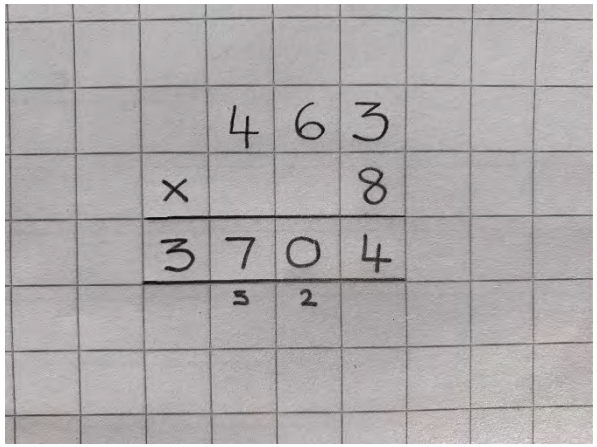
Year Six Multiplication

KPIs

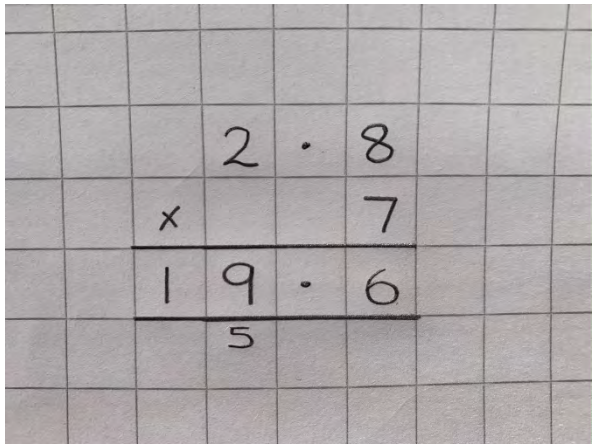
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Solve problems involving multiplication, including scaling by simple fractions and problems involving simple rates
- Multiply proper fractions and mixed numbers by whole numbers

Short multiplication including decimals

Children to continue to use **formal short multiplication** following Year 5.

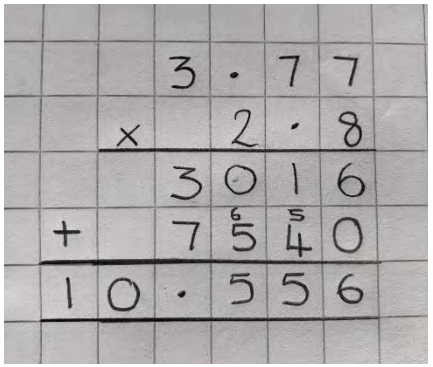


Children to continue to use formal short multiplication for a **decimal** multiplied by a **whole number.**



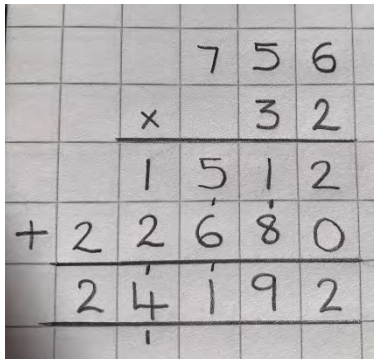
Decimals multiplied by decimals

Children learn that the amount of decimal places in the question is the total number of decimal places in the answer.

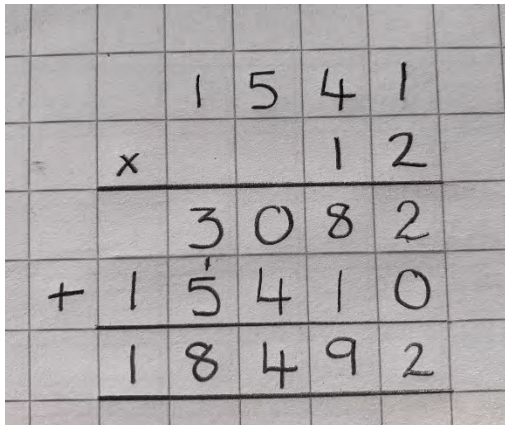


Long multiplication

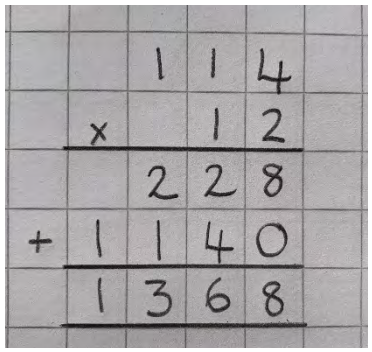
Children should be able to use **formal long multiplication**. **0** used as a **place holder**.



Children will then move onto multiplying larger numbers.

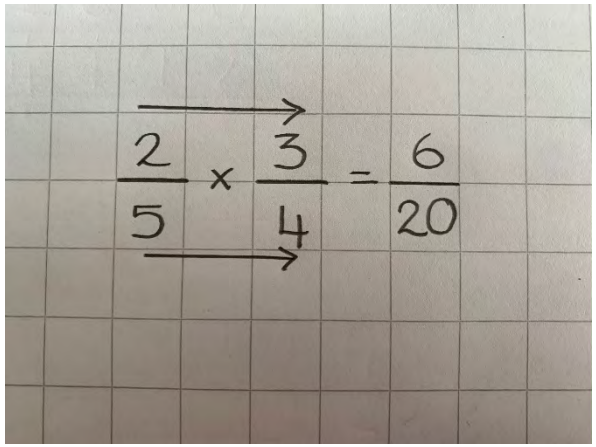


Children to use this to solve **word problems.**
An author writes a book 114 pages long, he prints 12 copies to send to publishers, how many pages does he print?

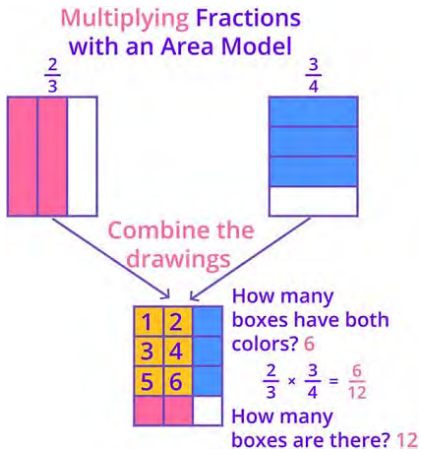


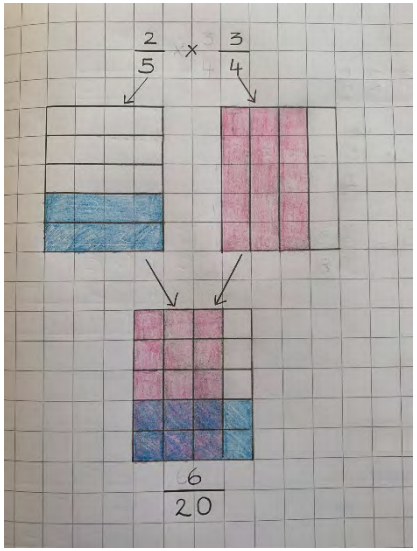
Fractions Multiplied by Fractions

Children shown to multiply across numerators and denominators.



Bar model to show multiplying fractions by fractions.

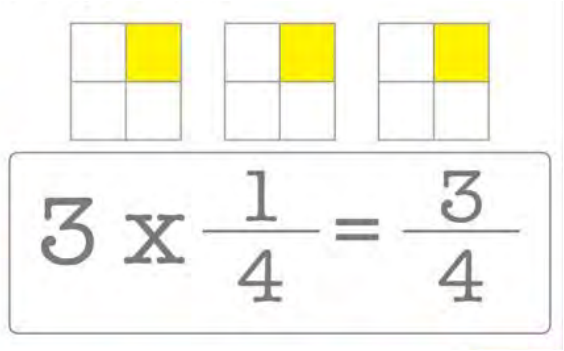


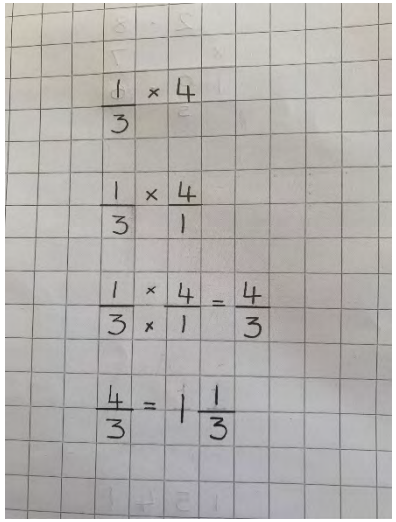


Fractions multiplied by whole numbers

Children reminded that a **whole number** can be written as fraction over 1 and then multiplied across as when multiplying fractions.

Revision of Year 5 KPIs.



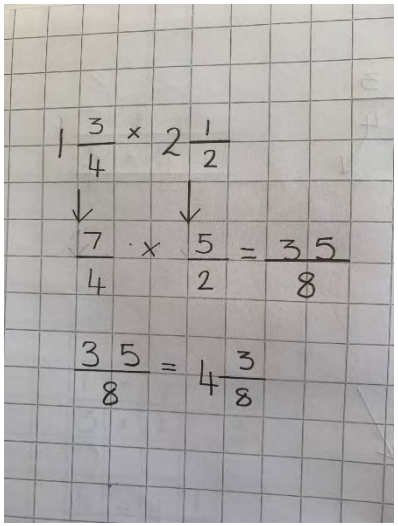


Mixed numbers Multiplied by Mixed Numbers

Children are taught to change **mixed numbers** into **improper fractions** and then multiply across as with multiplying fractions.

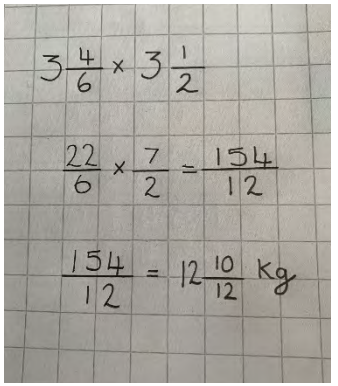
They should then be reminded to change the improper fraction to a mixed number.

Refer to Year 5 multiplying with mixed numbers.



Word Problem

A package of papers weighs 3 4/6 kilograms. If Amelia weighs 3 ½ packages, how much will it weigh?



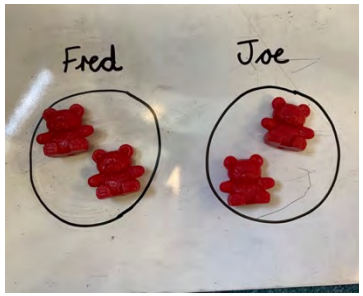
Early Years Division

KPIs

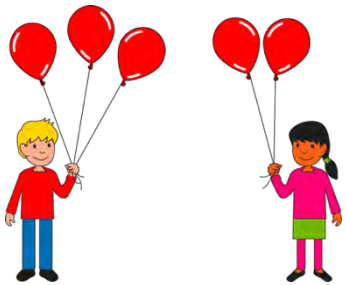
- Understand the concept of fair share and halving.

Fair sharing

Children will use everyday objects in the classroom and outdoor area to share 'fairly'. Understanding the concept of a fair share: having **equal amounts**.



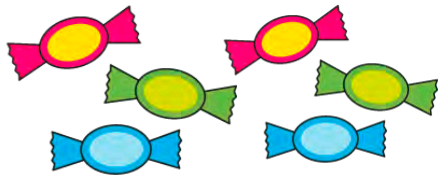
Children to explore the difference between what **is sharing fairly** and what is not.



Fred **shared** some balloons with Joe. Has he shared fairly?

Children to explore **sharing** through real life problems.

"We have 6 sweets. We want to **share** them between Ben and Sam. How can we **share** these **fairly**?"

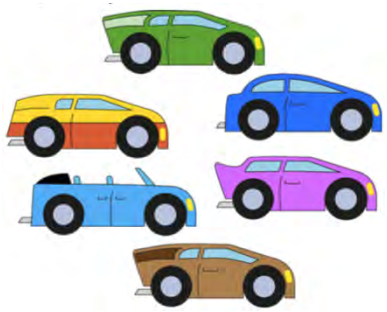


Halving

Using concrete resources to explore having amounts. What do they children notice? Do they groups have the same amount?

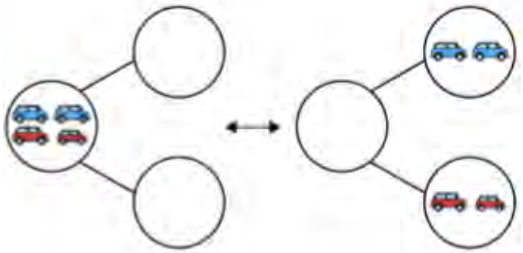
Half of 6 = 3

Children can share using towers and compare the different groups to see if they are **equal**.



"Sam needs to share **half** of his cars with his brother. How many cars will they have each?"

Children to use the **part whole model** alongside the part whole model.



Half of 4 = 2

Year One Division

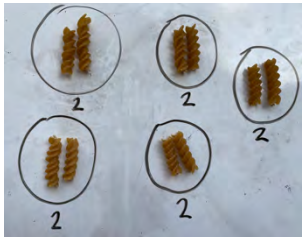
KPIs

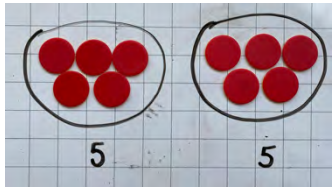
- Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Sharing

Children should experience **sharing** out **equally** in real life situations as well as with concrete apparatus. They should understand the notion of a fair share between 2, 5 and 10.

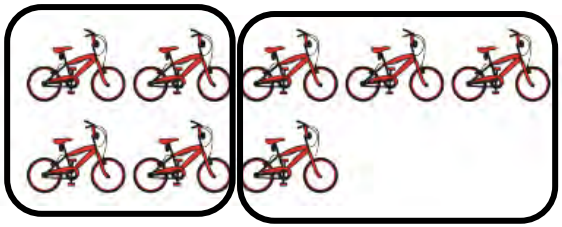
10 pasta pieces shared between 5 friends is 2 each!
10 ÷ 5 = 2



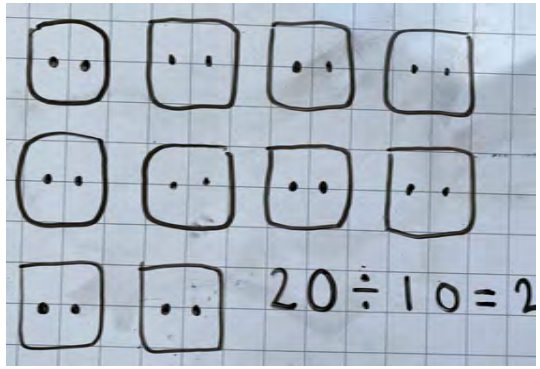


Children can then move onto having pictorial images to support **sharing** out between groups by crossing out to ensure they have shared all.

Can you share the bicycles between 2 schools?



Children will use pictorial drawings to share out as their most abstract method in year 1. They may use the **division** symbol alongside as well.

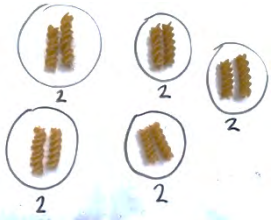


Grouping

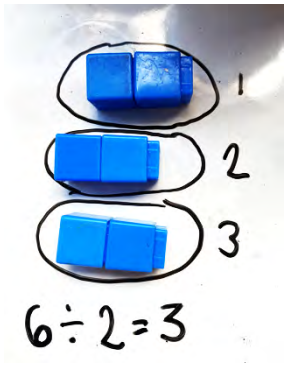
Children should experience grouping objects into groups of the multiple. Ex placing objects into groups of 5 and seeing how many groups there are in total through concrete equipment.

Group 10 pasta pieces into groups of 2. There are 5 groups in total.

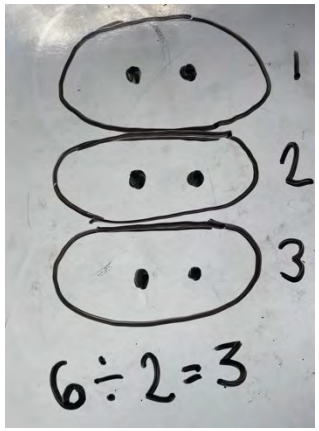
10 ÷ 2 = 5



Children may move onto cubes so they can move into utilising arrays pictorially and then finally more abstractly in the final stage by drawing them.



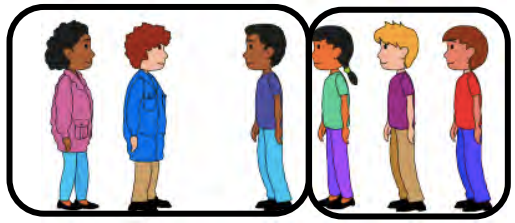
Children will utilise arrays to put a number into groups of 2, 5 or 10 and count how many groups total.



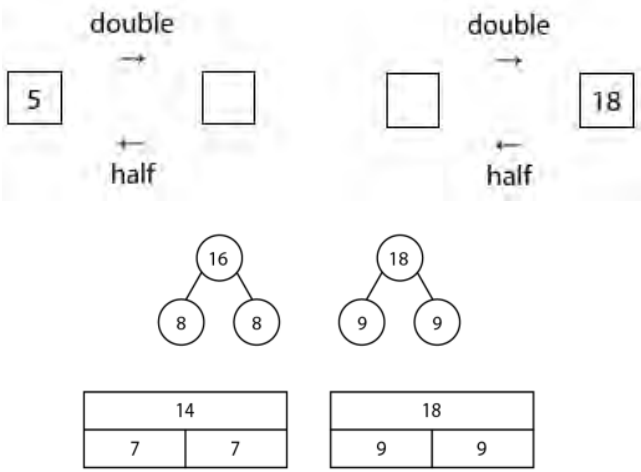
Halving

Use of concrete objects to share or split items equally between 2 groups.

Children may use pictorial images to support sharing items into 2 groups or **halving** the items pictorially.



Half of 6 is 3

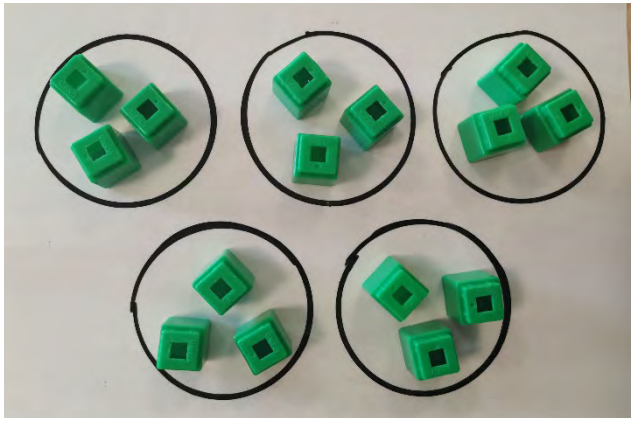
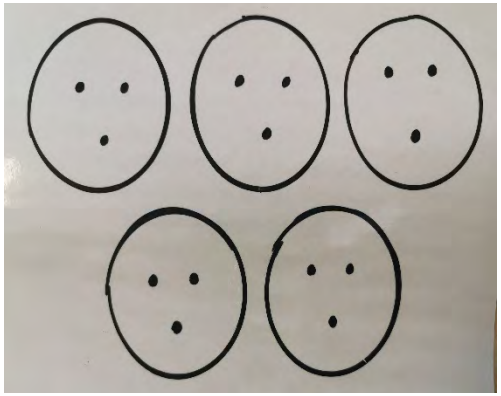
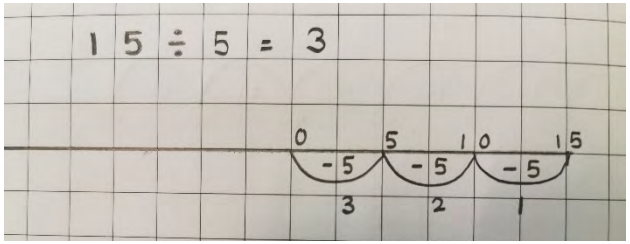


Year Two Division

KPIs

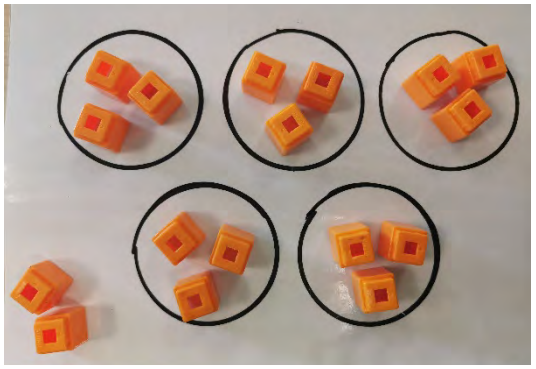
- Can recall division facts for the 2, 5 and 10 multiplication tables to solve simple problems, demonstrating an understanding of commutativity as necessary (e.g. knowing they can make 7 groups of 5 from 35 blocks and writing 35 ÷ 5 = 7; sharing 40 cherries between 10 people and writing 40 ÷ 10 = 4.

Sharing

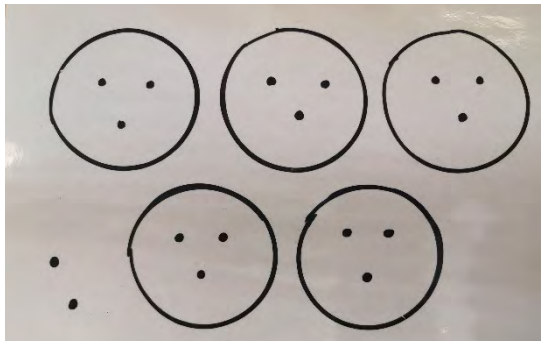
Children begin with continuing their concept of the idea of **fair sharing** using concrete objects within the classroom. 15 ÷ 5 = 3 	Children can move on to using pictorial methods to **share** out **equally.** 	Children use **repeated subtraction** to show **equal groups.** 

Sharing with Remainders

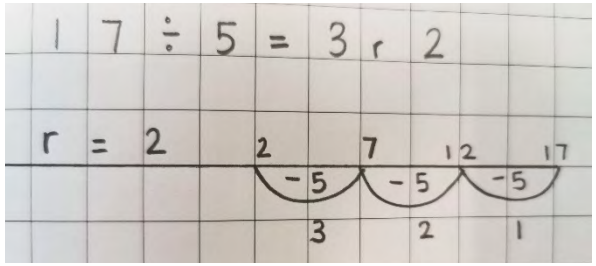
Children use concrete resources to understand the concept of **remainders.** The ideas that sometimes there cannot be a **fair share.**



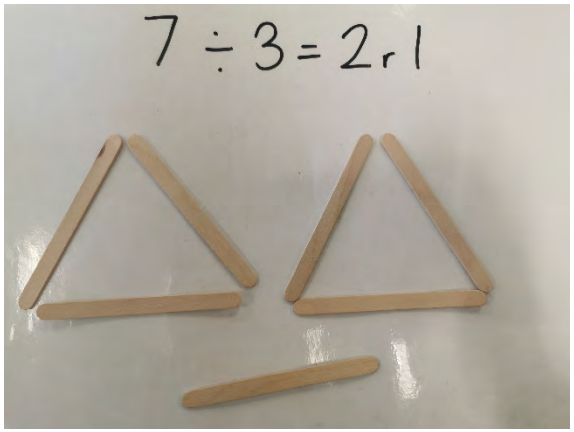
Children can use pictorials within books or whiteboards to solve **division** sentences through **sharing** out between 2, 5 and 10 **equally.**

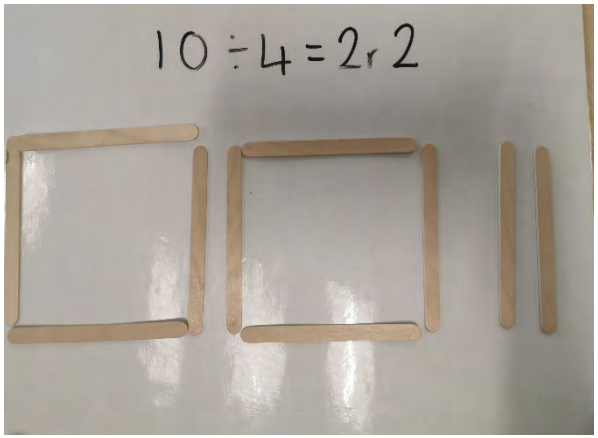


Children use **repeated subtraction** to solve **division** sentences by counting back from a number not **divisible** by 2, 5 or 10.



Add one digit and two-digit numbers within 20 by counting on

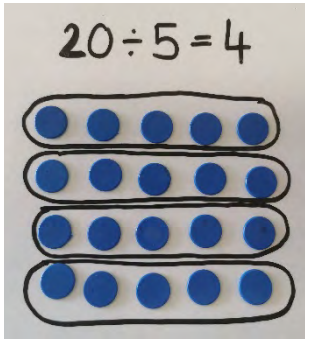


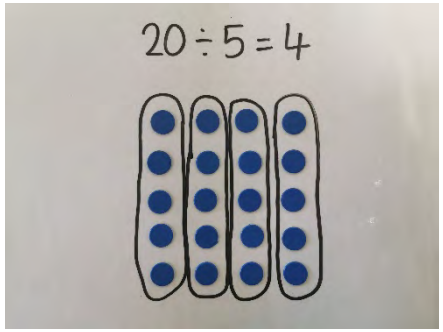


Children can explore the idea of **remainders** through use of lolly sticks. What shapes can you make with x number of sticks? Is there any left over? Why?

Grouping with Arrays

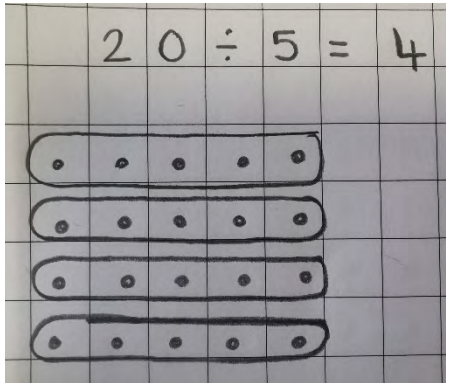
Children use concrete resources to understand the concept of **grouping.** Children will place the resources in **groups** of the multiple and then count how many **groups** they have made.

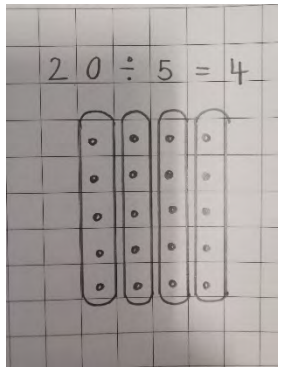




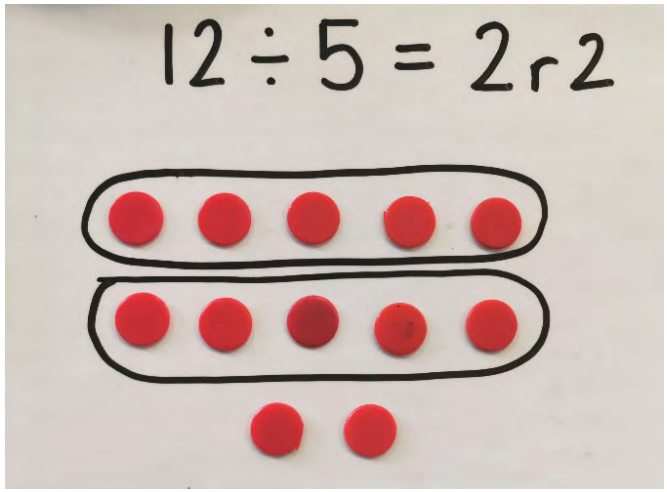
Children will use pictorial methods of arrays within their books to solve **division** sentences.

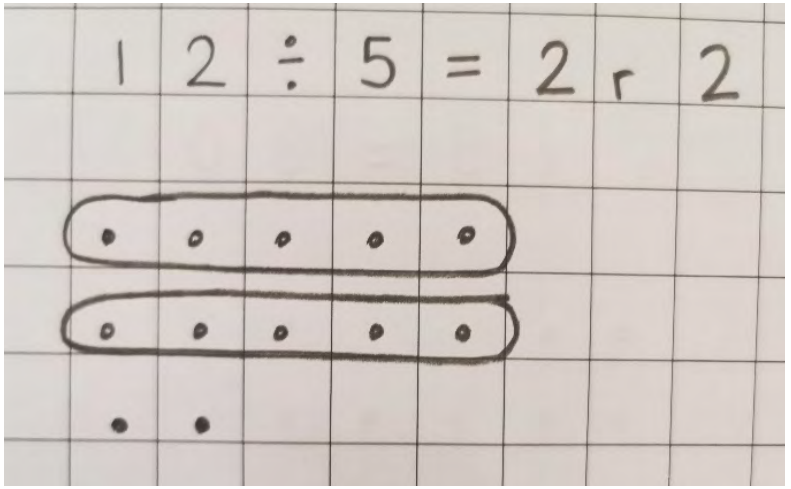
For abstract children will practice counting in multiples.





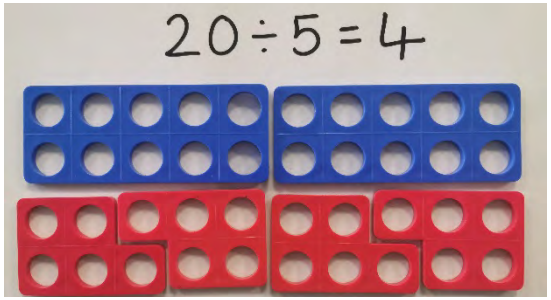
Grouping Arrays with Remainders

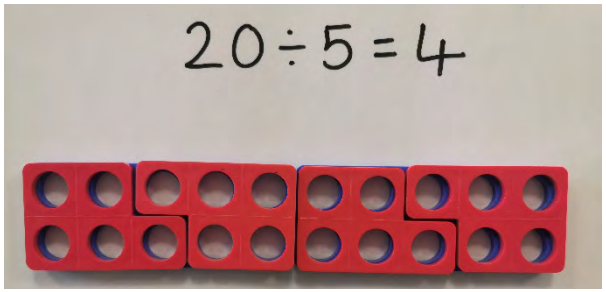


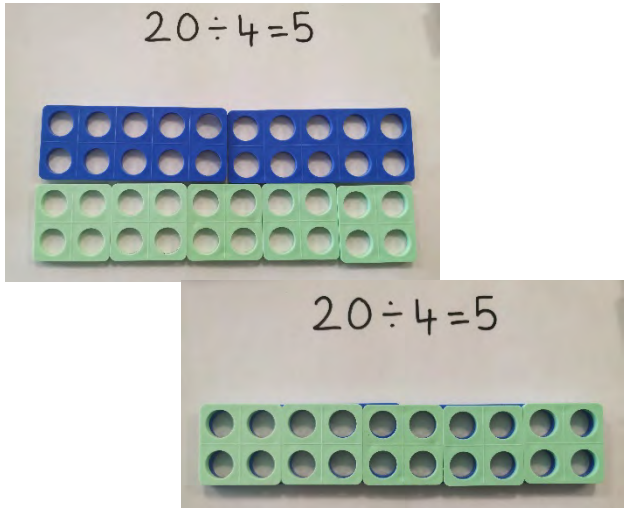


Grouping with Numicons

Children use numicons to solve **division** sentences to understand the concept of **groups** of multiples within a number.

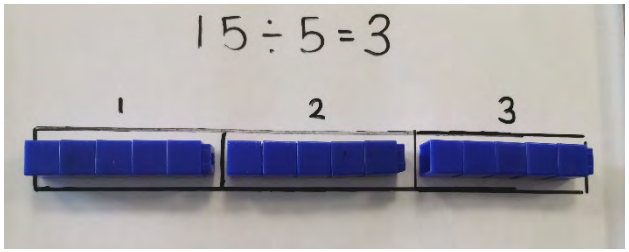




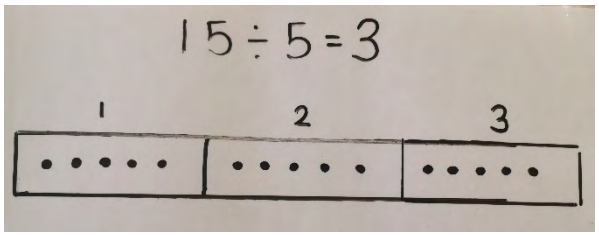


Bar Model grouping

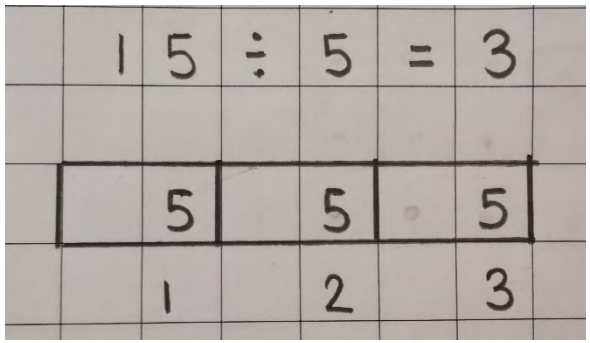
Children can use cubes to create a bar model to support their understanding of **grouping.** Ensure children count in the multiple until they have reached the total and then count how many **groups** they have created.



Children to draw pictorial representation of bar model to show understanding of counting in **multiples.**



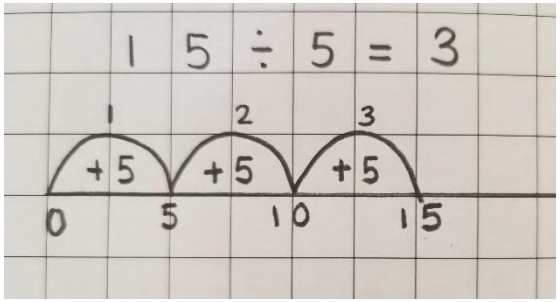
Children to draw bar model in books and count on in **multiples.**



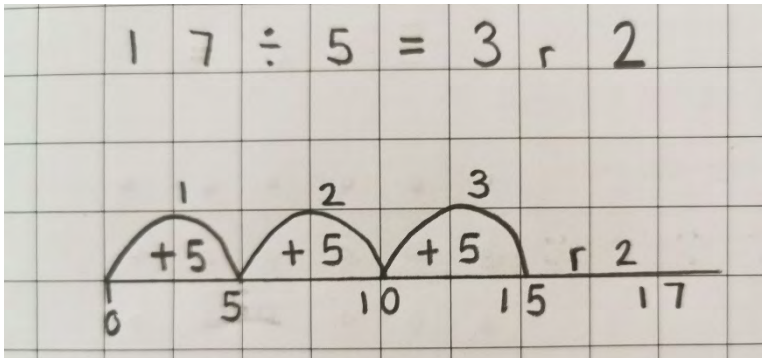
Number line Repeated Addition

Children will move onto a more formal method to solve **division** problems within the 2, 5- and 10-times tables.

Beginning the year starting with **counting** on in groups of to reach the total **amount.**

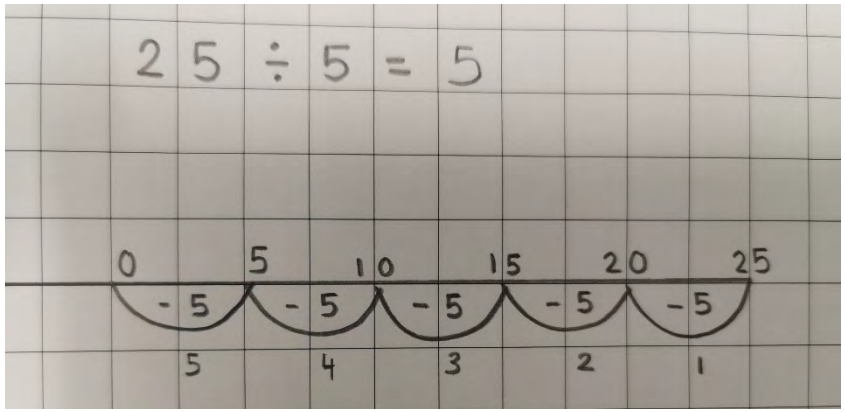


Children work out with **remainders.**

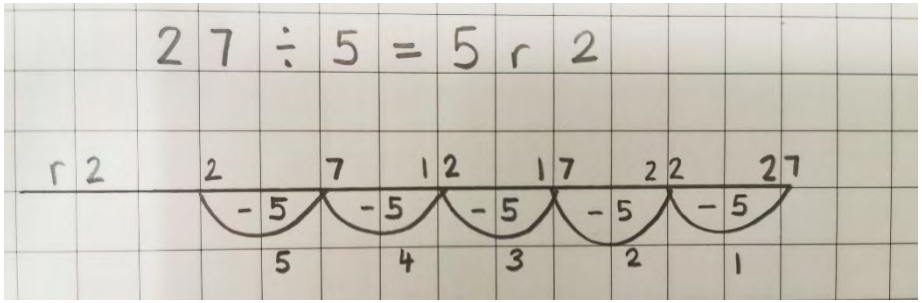


Number line Repeated Subtraction

Towards the end of the year, children should attempt to use **repeated subtraction** on a number line to prepare them for **chunking** in year 3.



Greater depth children could use this method as well when working out **remainders** as they have to count back to a number that is unfamiliar to them. This would not be a method to use with whole class when leaning remainders.



Year Three Division

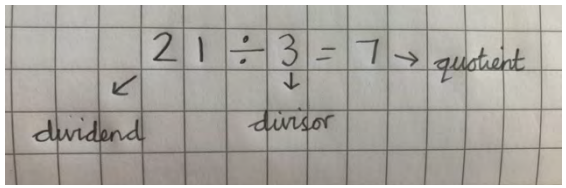
KPIs

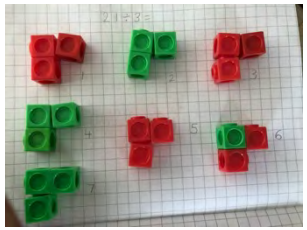
Pupils should be taught to…

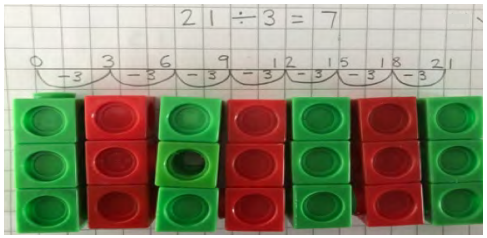
- Recall and use division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for division using the
- multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

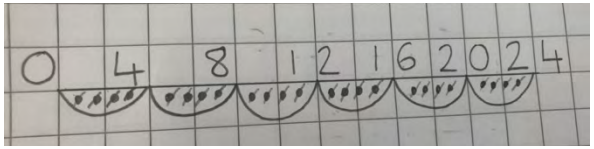
Repeated subtraction number line

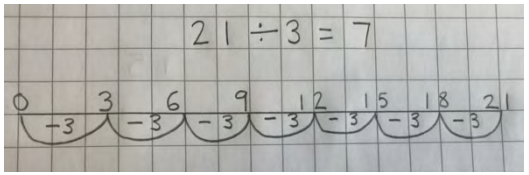
Division sentence with concrete materials (cubes or counters), putting into groups of the divisor.	**Subtracting** repeatedly alongside concrete resources, or pictorially using a number line.	Repeated subtraction using an abstract number line.

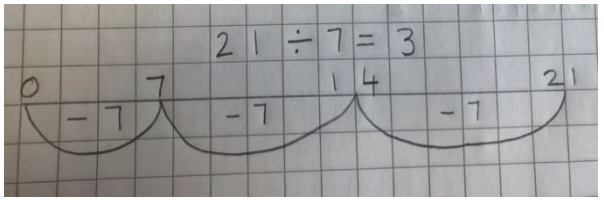


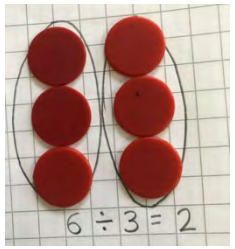
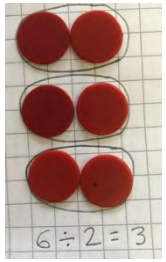
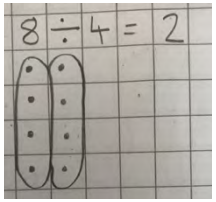
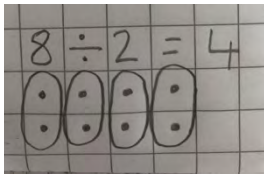
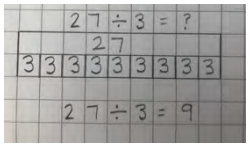
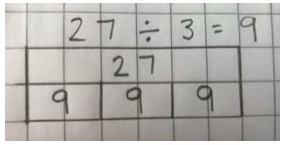
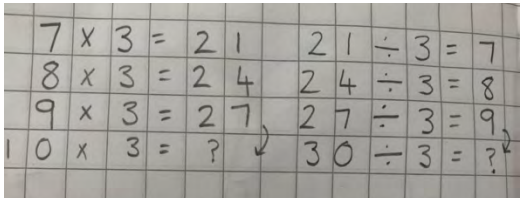










Division sentences		
Find the quotient using an array, circling groups of the divisor. Use concrete materials such as cubes or counters.  	**Find the quotient using a pictorial array, circling groups of the divisor.**  **10 ÷ 2 = 5** **10 ÷ 5 = 2** 	Find the quotient using an array, circling groups of the divisor, alongside an abstract method or using knowledge of known facts.  
Bar model		
Use of **Cuisenaire** or **unifix** to represent the division sentence via a bar model. 	Use of drawn **bar method** to show the **divisor** and **dividend**. Also represent the inverse of the same number sentence using a bar model. **27 ÷ 3**   **Use concrete materials alongside if still needed.**	In addition to abstract number line, use of times table knowledge to work out division sentences, as well as the inverse.  *If I know… then I also know… because…*

Word problem with the bar model

Read the problem, underlining the **key information.**

There were **14 glue sticks. Miss Basi wanted to put 2 in each pot. How many pots will she fill?**

Identify number sentence.
Represent the problem in a **bar model** using images or cuisenaire to support.

14 ÷ 2 = ?

14						
2	**2**	**2**	**2**	**2**	**2**	**2**

Complete number sentence and answer in words.

14 ÷ 2 = 7
14 ÷ 7 = 2
2 + 2 + 2 + 2 + 2 + 2 + 2 = 14

Miss Basi will fill 7 pots

Word problems and scaling problems

Word problems with 2-digit numbers x 1-digit numbers.

Sharing word problem

In the forest, three friends found 18 conkers. How many conkers will they get each?

18 ÷ 3 = 6

Each child will get 6 conkers.

Grouping word problem

Elm Tree **has 45 books.** There can be **5 books** on **each shelf.** How many shelves are there?

45 ÷ 5 = 9

Elm Tree's bookshelf has **9 shelves**

Scaling word problem

Leo has **32 sweets.** Suri has **4 times less** sweets than Leo. **How many** sweets does Suri have?

32 ÷ 4 = 8

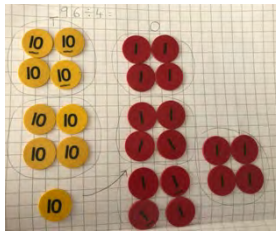
Leo	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Suri	**4**							

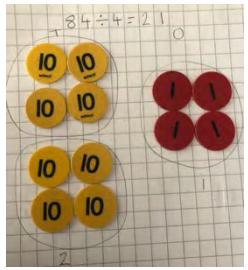
Suri has **4 sweets.**

Expanded short

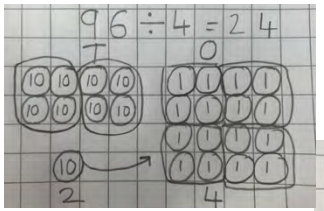
Use concrete materials such as **place value counters or base 10** to calculate a **two-digit number divided by a one-digit number.**

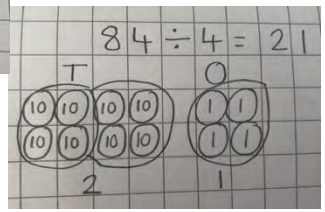
Number sentences here to see



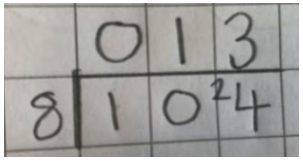


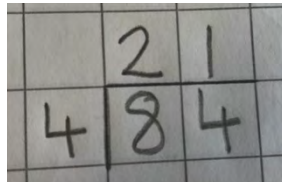
Use a pictorial method to calculate a two-digit number divided by a one-digit number.





Once secure with concrete and pictorial methods, use the **expanded short** method to divide a **two-digit number** by a **one-digit number.**





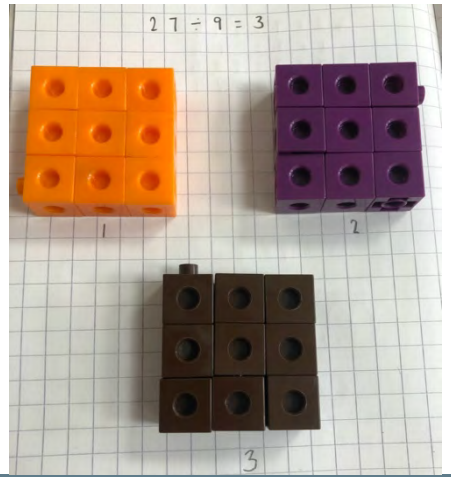
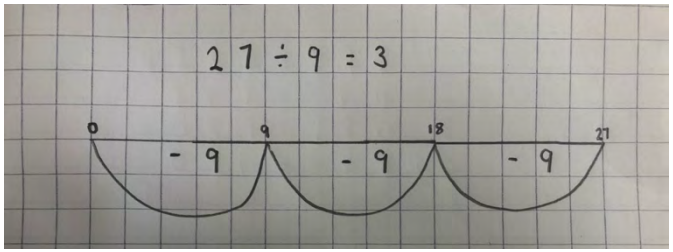
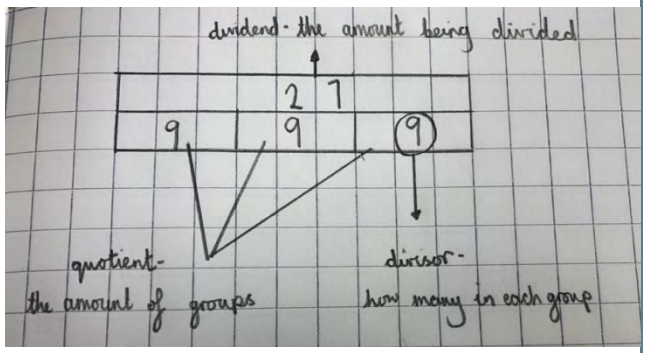
Year Four Division

KPIs

Pupils should be taught to…

- Recall multiplication and division facts of multiplication tables up to 12 x 12
- Count up and down in hundredths: recognize that hundredths arise when dividing an object by one hundred and dividing tenths by ten
- The pupil can use formal methods to solve problems, including multi-step

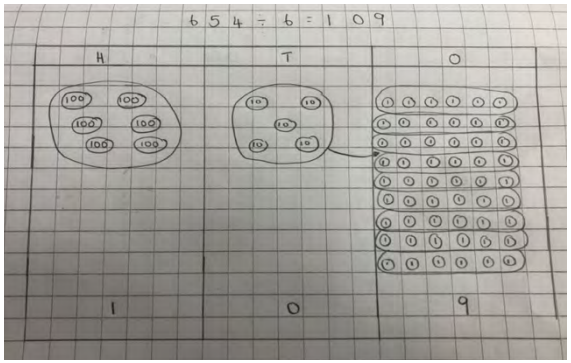
Division sentences

Show the quotient in equal groups.	Show the division sentence using **a number line**	Draw the **bar model.**
27 ÷ 9 = 3 	27 ÷ 9 = 3 	27 **(dividend)** ÷ 9 **(divisor)** = 3 **(quotient)** 

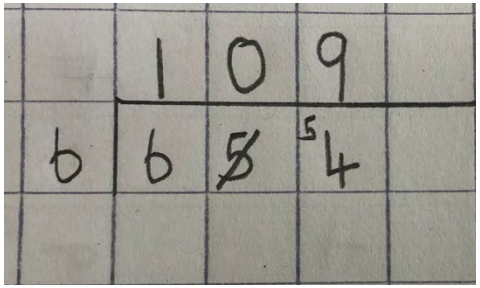
Formal method

Use the **place value counters** to show the division number sentence.

To show the **pictorial representation**, the children can draw the place value counters

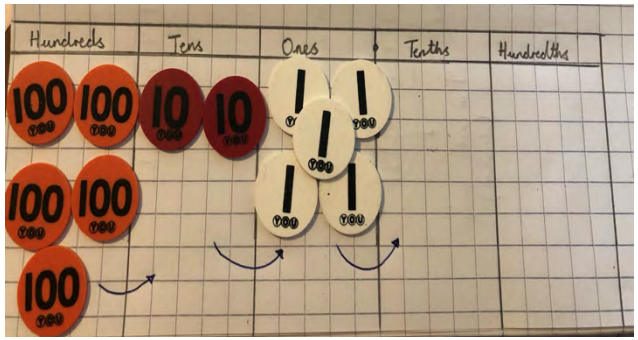


The **abstract representation**, the children write the number sentence

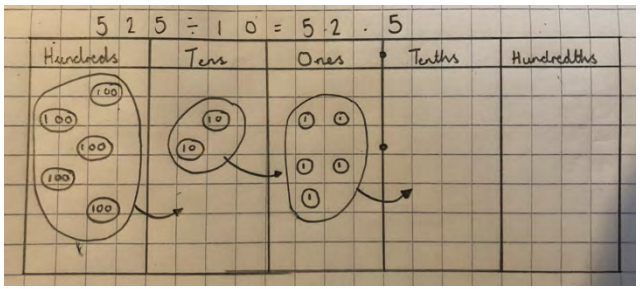


Dividing by 10

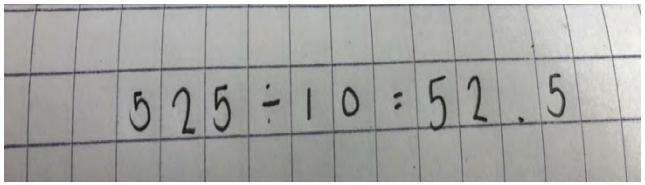
Use the **place value counters** to show the division number sentence. Each value moving 1 decimal places.



To show the **pictorial representation**, the children can draw the place value counters moving one decimal places

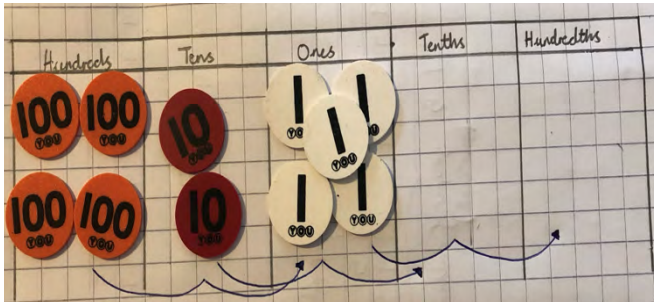


The **abstract** representation, the children write the number sentence

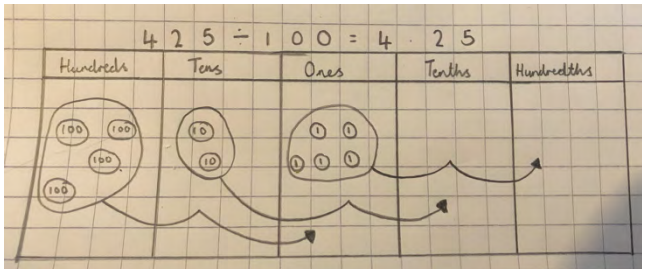


Dividing by 100

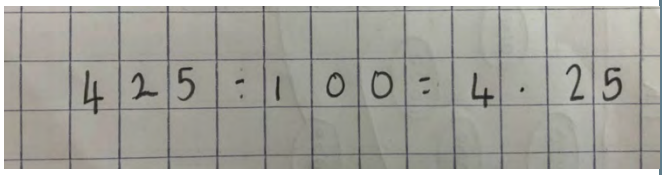
Use the **place value counters** to show the division number sentence. Each value moving **2** decimal places.



To show the **pictorial representation**, the children can draw the place value counters moving three decimal places



The **abstract representation**, the children write the number sentence

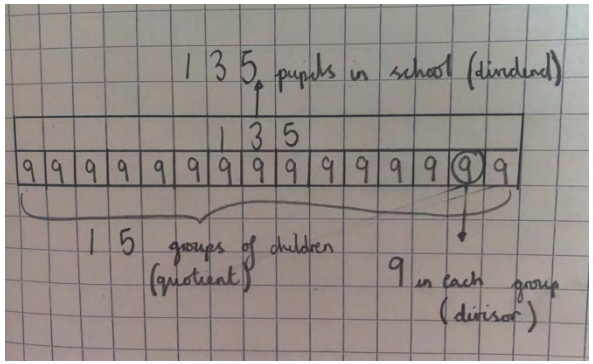


Word problems

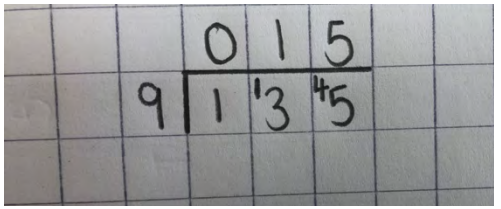
Read the problem, underlining the **key information.**

There were **135 pupils** in the school. Each group had **9 pupils** in it. How many **groups** were there **in total**?

Draw the **bar model** and the bar will be in parts of the multiplier. The multiplicand will be shown in the parts.



Use the **compact method** to multiply a two-digit number by a one-digit number



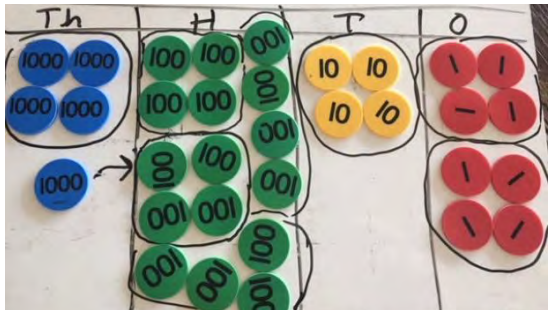
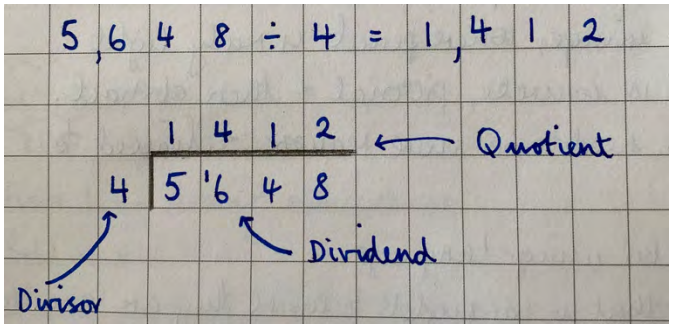
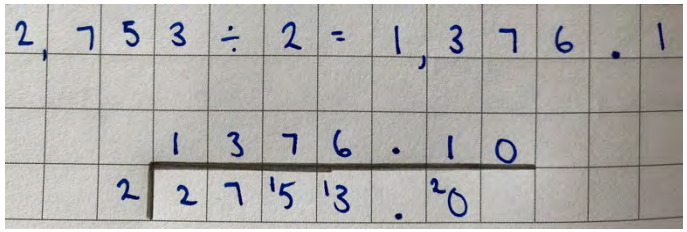
**** once secure with this method, use it to check the inverse of multiplication questions that result in a 4-digit answer**

Year Five Division

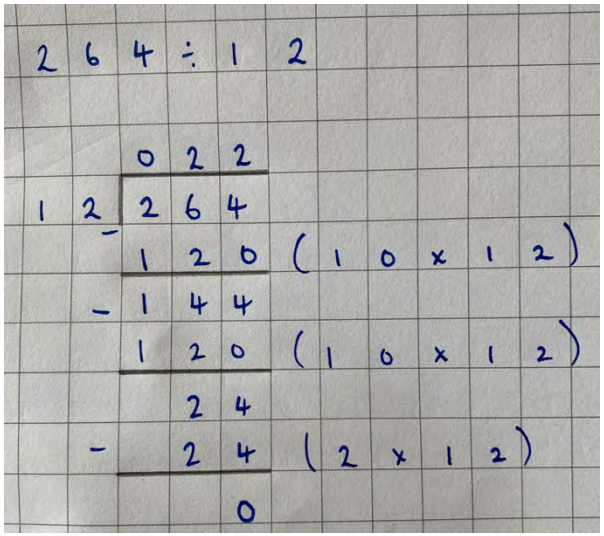
KPIs

- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Divide whole numbers and those involving decimals by 10, 100 and 1,000
- Solve problems involving division, including using their knowledge
- Solve problems involving addition, subtraction, multiplication and division
- Combination of these, including understanding the meaning of the equals sign

Short division

Children should understand **short division as grouping**. Start by using concrete to enable the children to explain what happens to each of the digits and how this translates into an abstract method. 	Children will also label numbers using appropriate terminology, which they will be able to apply to the **short division method**. 	Short division to be used when using **divisors** that are less than 10 and **remainders** should be expressed as decimals. 

Expanded long division

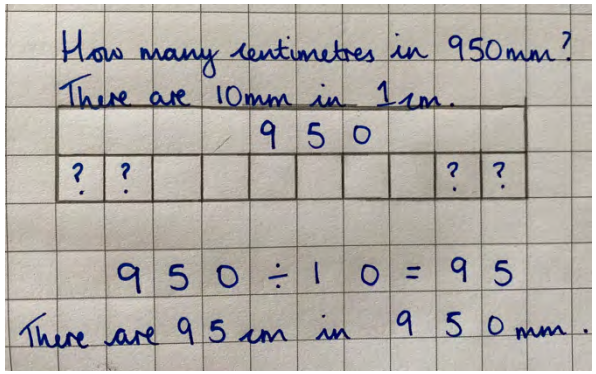


In preparation for year 6, children who are ready will progress onto using **expanded long division**. They will learn this strategy using multiples of the divisor to subtract until nothing remains. They will use this method for divisors including and exceeding 12.

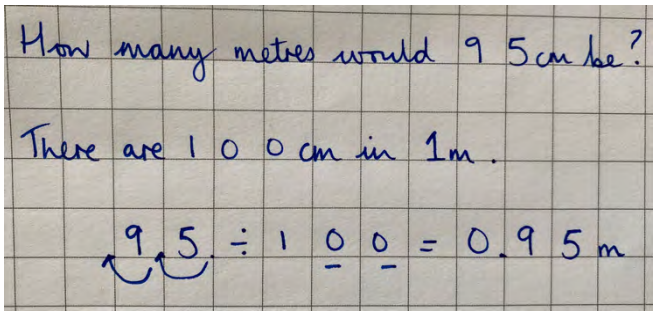
Children should be secure with short division and knowledge of their times tables before being introduced to this calculation method.

Dividing by 10, 100 and 100 including decimals

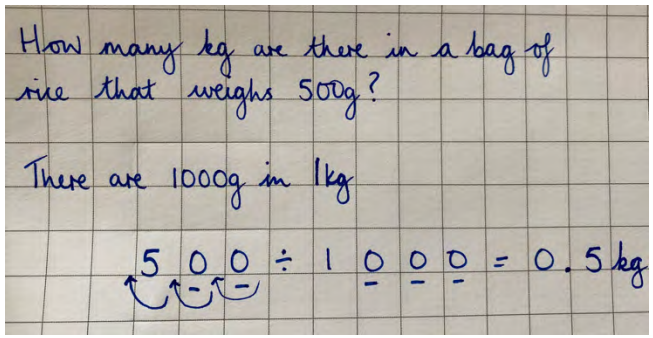
Children may use the **bar model** to represent worded problems that are presented within a context.



When **dividing by 10, 100 and 1000**, children should be presented with problems which contain a context and require them to convert between standard units of measure.



Dividing by 10, 100 and 1000 will also include the use of decimal numbers, especially through the context of conversion.

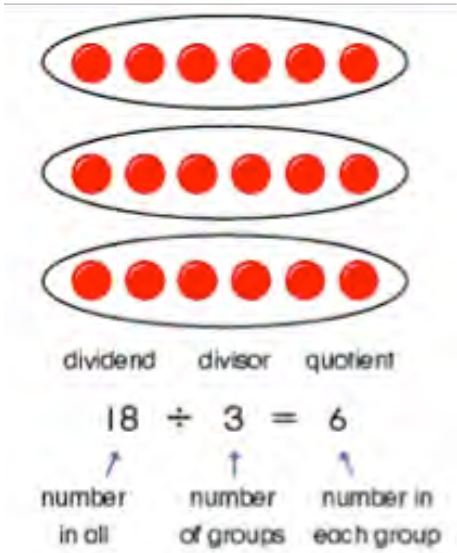


Year Six Division

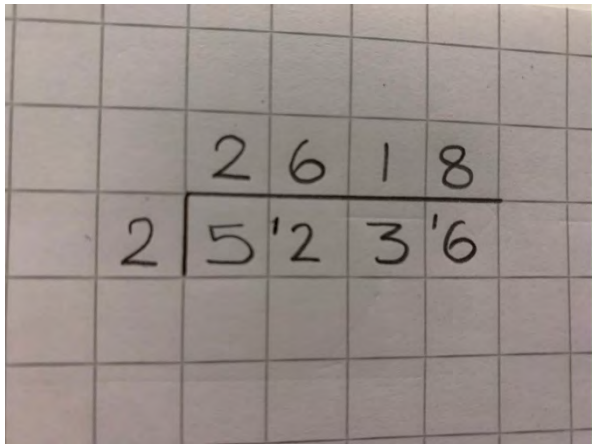
KPIs

- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of short division and interpret remainders as decimals
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division
- Interpret remainders as decimals
- Solve problems involving addition, subtraction, multiplication and division
- Divide fractions by whole numbers

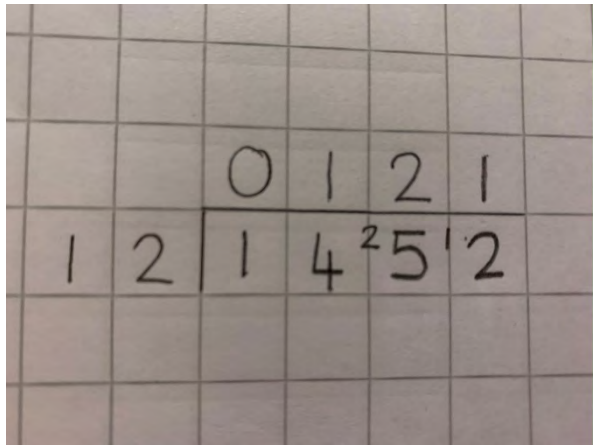
Short division



Short division carrying remainders to the right hand side.

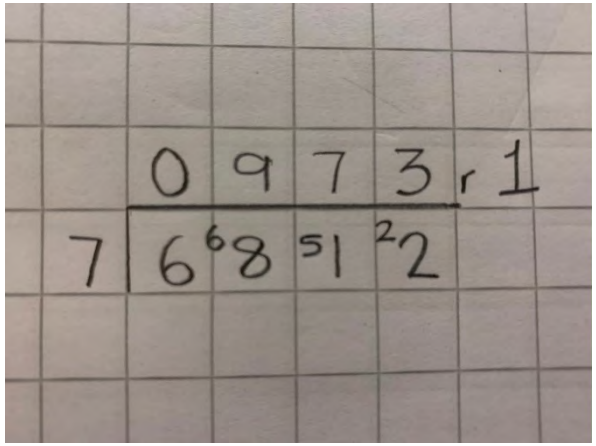


Short division to be used with **divisors** up to twelve.

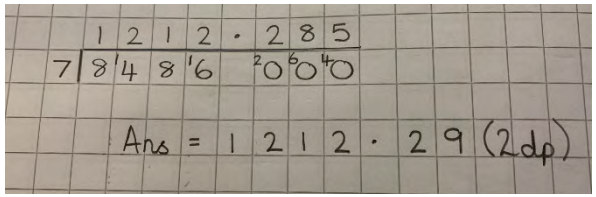


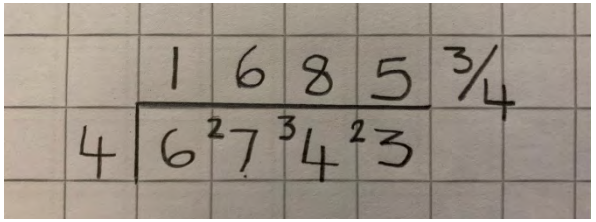
Short Division with Remainders

Short division with the **remainder** expressed as a whole number.

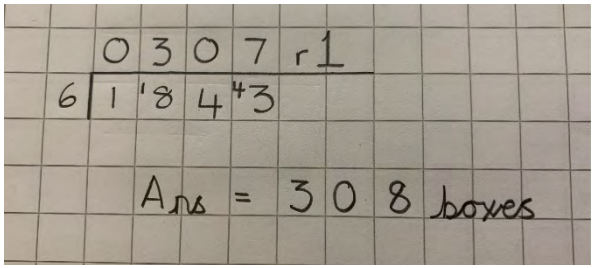


Children will also be taught how to express **remainders** as a **decimal** (to 3dp) and a **fraction.**



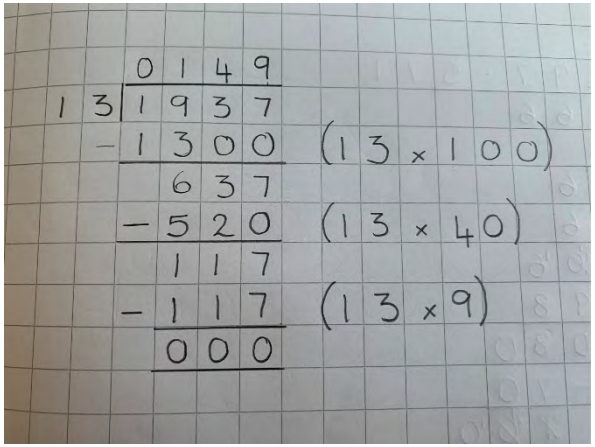


A farmer has 1843 eggs. A box takes 6 eggs. How many boxes will he need to transport all the eggs?



Children will be taught to round up or down depending on the **context** of the question.

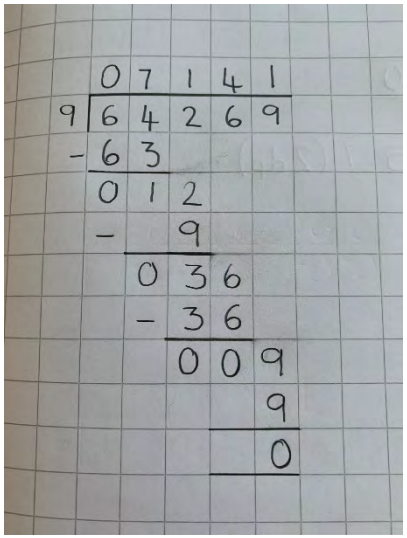
Expanded Long Division



Children will revise **expanded long division** using multiples of the divisor to subtract until nothing remains.

Children should be reminded that this is an informal method and that formal long division should be used wherever possible and this method is to be used to secure understanding.

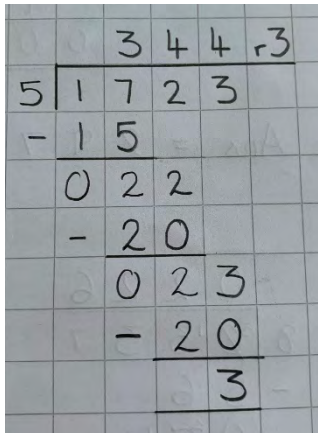
Long Division



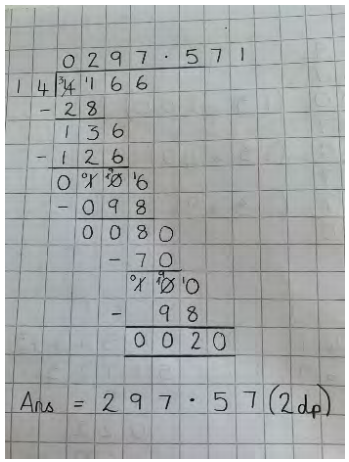
Children should be taught the **formal method of long division**.
They need to understand that they subtract a multiple of the **divisor** from the first two digits and then drop the next digit down to create a new two digit number to subtract from.
They continue to do this until they have nothing left or are left with a remainder.

Long Division with Remainders

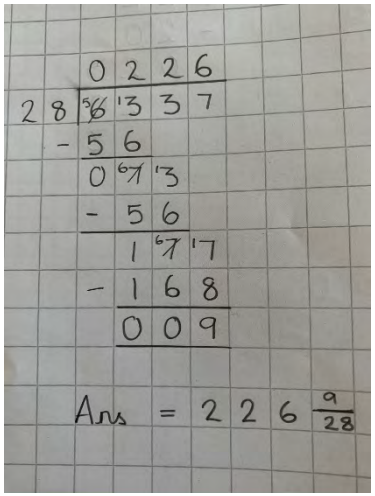
Remainders can be expressed as a whole number.



As a decimal by placing a zero after the remainders and continuing to divide. Decimals should be given to **3 decimal places** maximum. This should be the preferred method.

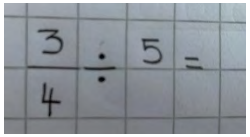


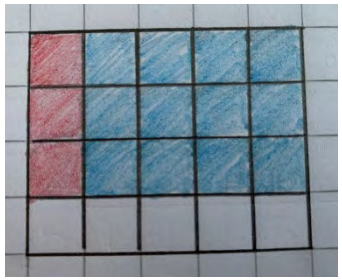
Remainders can also be expressed as a fraction (if the question is expressed as fractions then this can be used).



Dividing Fractions by Whole Numbers

Children start with a pictorial representation to show how each fraction of the original shape is then divided.

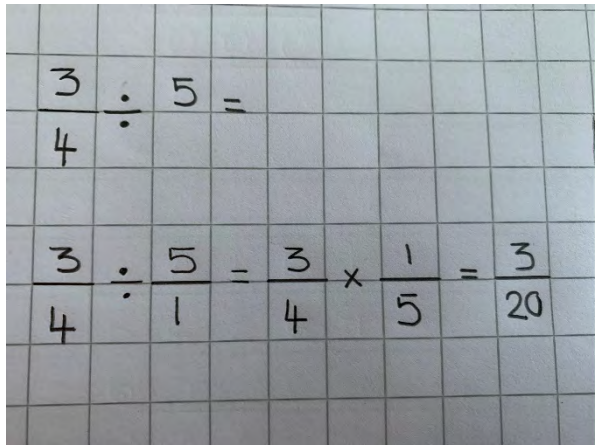




Children then move onto the **abstract method**.

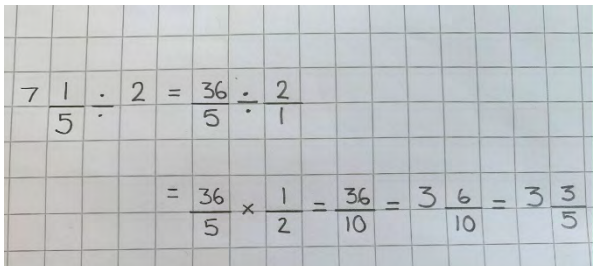
They will be taught to keep the first fraction the same, flip the second fraction so the numerator becomes the denominator and change the operation from dividing to multiplying.

They will then **multiply** the fractions together, as per the calculation polciy.



Dividing Mixed Numbers

Children will be taught to divide mixed numbers by whole numbers. They should be taught to convert the mixed number to an improper fractions and then divide using the fraction by fraction method.



Children should be taught to convert both mixed numbers when dividing mixed numbers by mixed numbers.