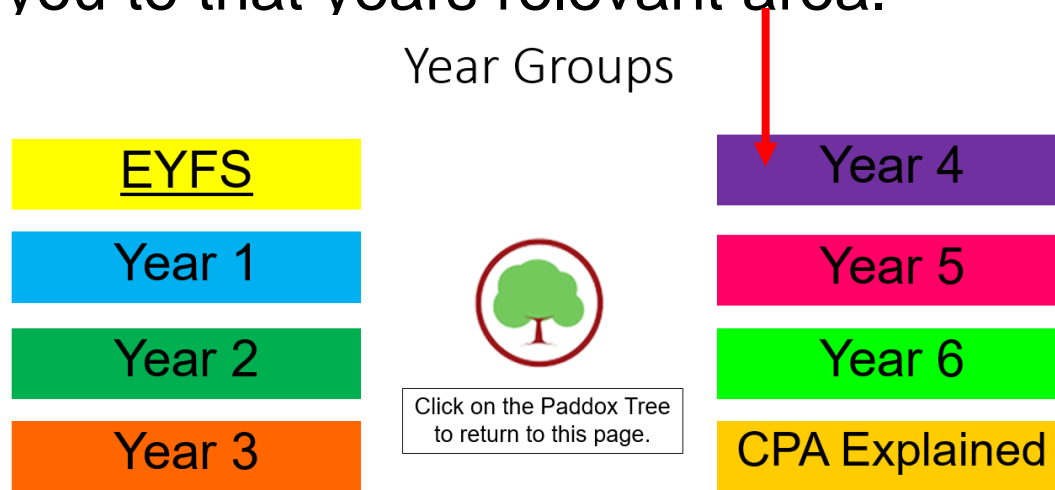# Maths at Paddox

Navigating this presentation.
(Please view in Presentation/Slideshow mode)

Clicking on a year group will take you to that years relevant area.

Once you have selected an area, you will then be able to explore the explanations and expectations of how that operation will be taught by clicking on one of the coloured rectangles.

Year Groups

EYFS		Year 4
Year 1		Year 5
Year 2		Year 6
Year 3		CPA Explained

Click on the Paddox Tree to return to this page.

Year 4

In Year 4, children will rely more on abstract methods for solving problems and will show their working out using a range of abstract, pictorial and abstract methods where appropriate.

Clicking on the Paddox tree will always return you to the Year Groups page.

| + Addition | - Subtraction | X Multiplication | ÷ Division |
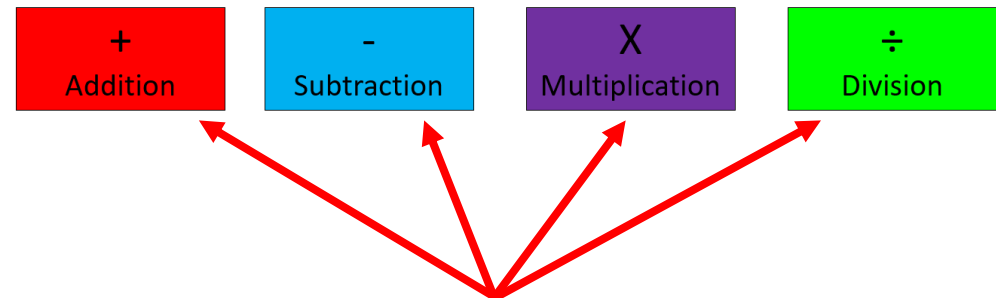
Navigating this presentation.
(Please view in Presentation/Slideshow mode)

You will be able to return back to the relevant year group page to explore the other operations for that year group by clicking on the "Return to…" option or back to the main Year groups Page by clicking on the Paddox Tree.

Return to Year 4	+ Addition	

Children will add numbers with up to four digits using formal compact written method. Including numbers involving money e.g.

2456 + 5378 = 7834

£23.59 + £7.55 = £31.14

$$
\begin{array}{r}
2\ 4\ 5\ 6 \\
+\ 5\ 3\ 7\ 8 \\
\hline
7\ 8\ 3\ 4 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
£\ 2\ 3\ .\ 5\ 9 \\
+\ £\quad\ 7\ .\ 5\ 5 \\
\hline
£\ 3\ 1\ .\ 1\ 4 \\
\end{array}
$$

But first a quick introduction to the journey of Maths at Paddox.

Our intent for Maths

- We develop our children to be resilient and motivated learners
- Able to tackle challenging problems with a positive attitude
- Our curriculum is achievable for all using a 'Mastery' approach
- We foster deep and sustainable learning
- Children can make rich and meaningful connections
- Future learning is built on solid foundations
- Every child will work hard to achieve their greatest potential
- We have a desire to see children flourish as mathematicians and to develop a love of Maths!

How does Paddox teach maths?

Paddox currently adopts two approaches towards the teaching of maths. For several years we have used White Rose Maths to promote a good structure of Maths and consistent opportunities for all pupils. White Rose Maths has enabled us to develop the confidence in our mathematicians at Paddox.

However, we are now ready to move forward in developing more mathematical opportunities and look at improving our teaching of maths as we strive to build confident, resilient and capable mathematicians.

On the next slide you will see how the approaches to maths are split.

How does Paddox teach maths?

EYFS and Year 1
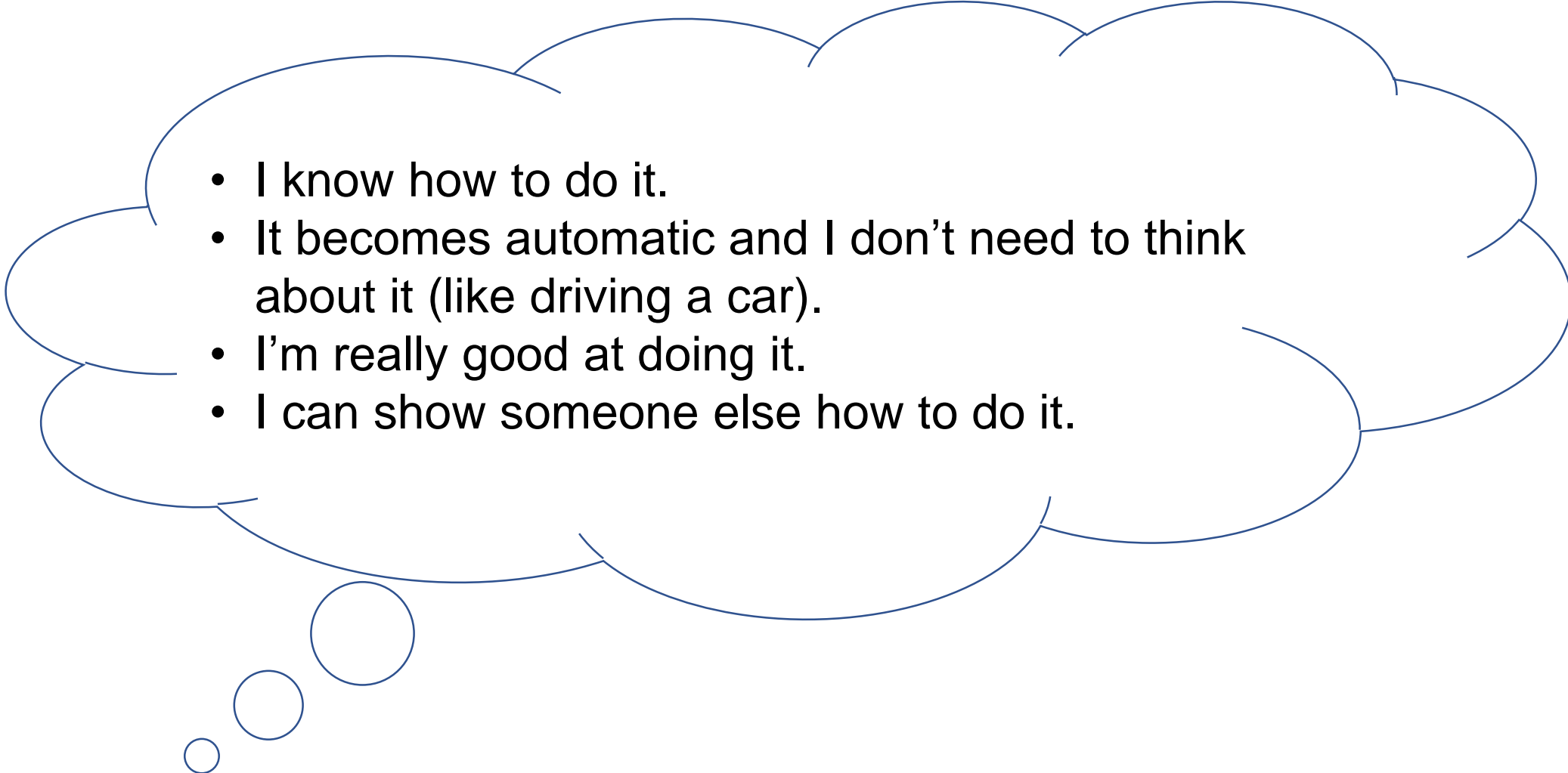
Early Years and Year 1 are now using Maths Mastery from the Ark Curriculum to deliver and develop mathematical concepts. This approach breaks down mathematical concepts and promotes a vocabulary of maths. We have already seen a huge rise in our learners confidence and their oracy skills.

Year 2, 3, 4, 5 and 6

Years 2-6 are still using White Rose Maths to traverse their mathematical journey. They continue to build on what they know develop fluency and problem solving skills. As the each year progresses White Rose will slowly be replace by Maths Mastery from the Ark. Year 1 will move into Year 2 with Maths Mastery and so on.

Teaching for Mastery

- **What does it mean to 'master' something?**

- I know how to do it.
- It becomes automatic and I don't need to think about it (like driving a car).
- I'm really good at doing it.
- I can show someone else how to do it.

Teaching for Mastery

- High expectations for every child
- Fewer topics covered in greater depth
- Number sense and place value come first
- Problem solving is central
- Challenge is provided through an increased depth, rather than acceleration of content

3. Some children, who feel confident, will be let loose. They'll be able to _explore deeper_ into the woods, before returning to the group to continue on the journey.

2. Some children will need a little _additional support_ along the way.

4. Children will not be racing off ahead on a different journey.

1. We all start the journey _together._

5. Children will not be left behind alone and isolated.

We're Going on a Maths hunt!

National Curriculum Aims

There are three main aims:

1) Fluency (accurately and rapidly recall and apply knowledge)

2) Reasoning (explain their mathematical thinking)

3) Problem Solving (apply their knowledge to solve problems in different contexts)

The stages of a lesson:

At Paddox we believe that small steps are key to success. Imagine trying to climb a ladder, smaller steps between each rung makes the ladder easier to climb and it is exactly the same with Maths!

Each lesson will feature fluency questions, problem solving and reasoning questions and a deepen the moment opportunity.
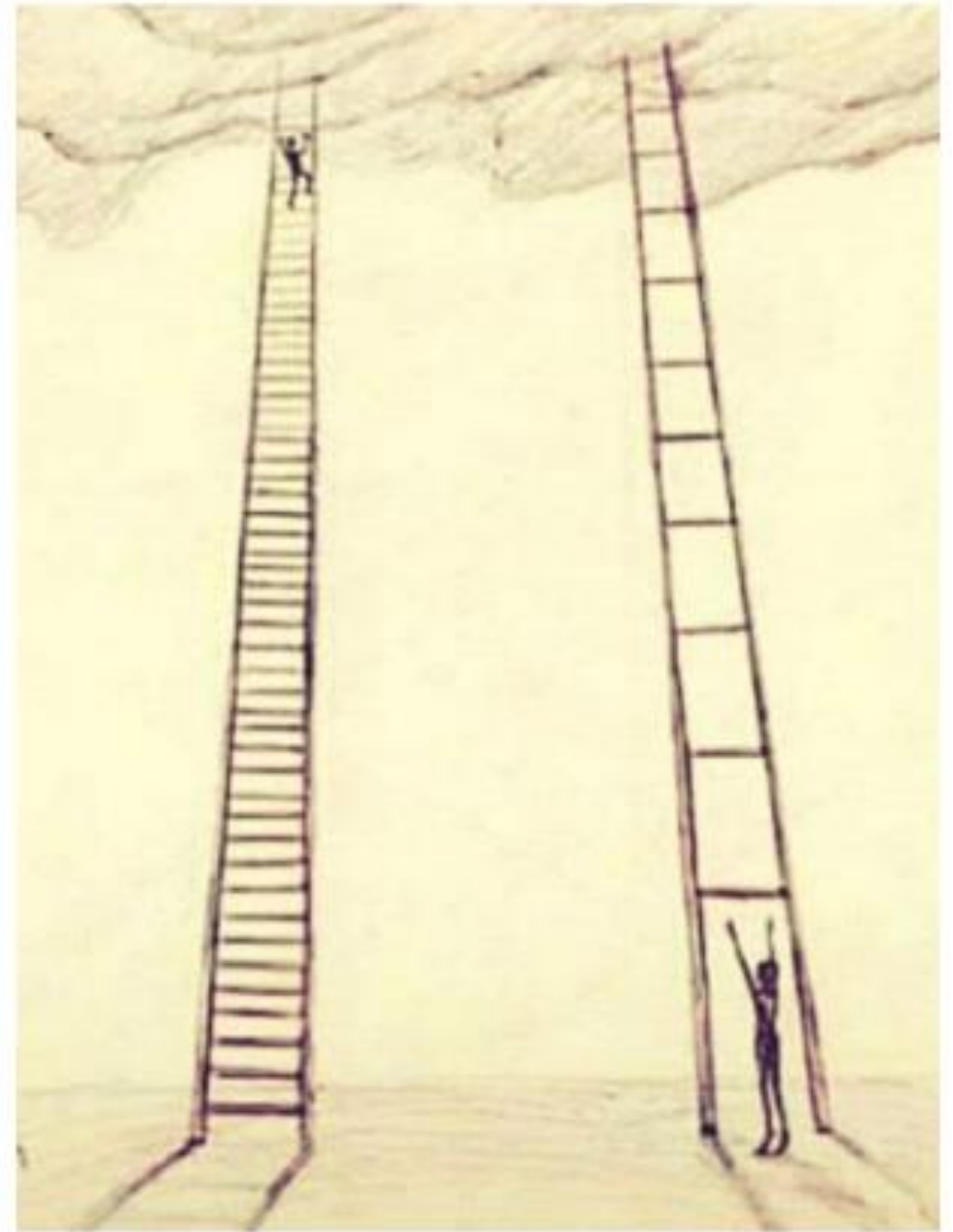
Maths Mastery

Maths mastery uses a 6 part lesson and builds upon 4 "Dimensions of Depth". These underpin all aspects of the curriculum and give children the opportunity to discuss their mathematical understanding and problem solve within all units of maths.

The Dimensions of Depth are:
- Conceptual understanding
- Language and communication
- Mathematical thinking
- Mathematical problem solving
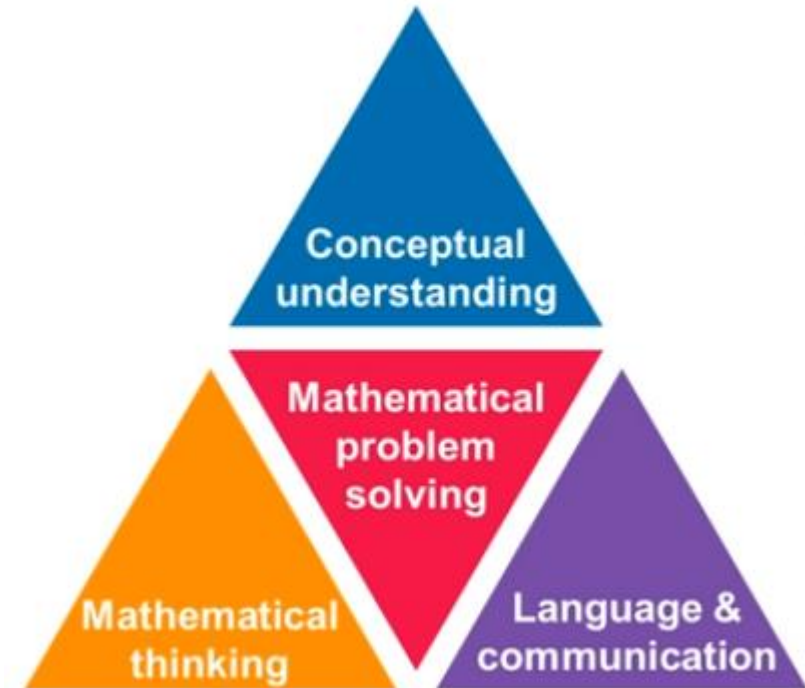
Fluency questions:

These help children practise and use straight forward skills in Maths. These are questions that allow children to apply what they know to find an answer. Here is an example from Year 3's Place Value teaching block.

Match the number sentence to the correct number.

| $20 + 19$ | $10 + 4$ | $40 + 0$ | $80 + 1$ |

| 40 | 14 | 81 | 39 |

Complete the part-whole model and write four number sentences to match.

28
20 ◯

___ + ___ = ___
___ + ___ = ___
___ = ___ + ___
___ = ___ + ___
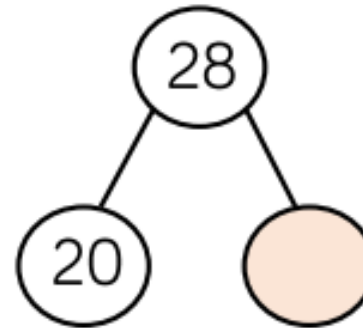
Dora has 20 sweets and Amir has 15 sweets.
Represent the total number of sweets:
- With concrete resources.
- In a part-whole model.
- As a number sentence.

Problem Solving questions:

These questions require children to dig deeper and use their understanding to help justify, explain and prove answers. In some cases there may be more than one answer! These questions give children the opportunity to challenge themselves and deepen their understanding further. Here is an example from Year 4 Addition and Subtraction:

White Rose Maths

Two children completed the following calculation:

$$1{,}234 + 345$$

Dora: My answer is 1,589
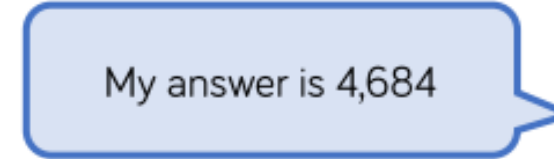
My answer is 4,684 — Alex

Both of the children have made a mistake in their calculations.
Calculate the actual answer to the question.
What mistakes did they make?

Deepen the moment:

Deepen the moment questions are designed by your child's teacher. These questions are the final challenge in a lesson for your child to apply everything they know to a question. This involves thinking carefully and critically and sometimes requires knowledge from a range of different topics. Here is an example from Year 2 Position and Direction:

Deepen the moment.

Pac Man wants to get to the top left yellow bulb.

What is the best/simplest way for him to get there without bumping into a colourful ghost?
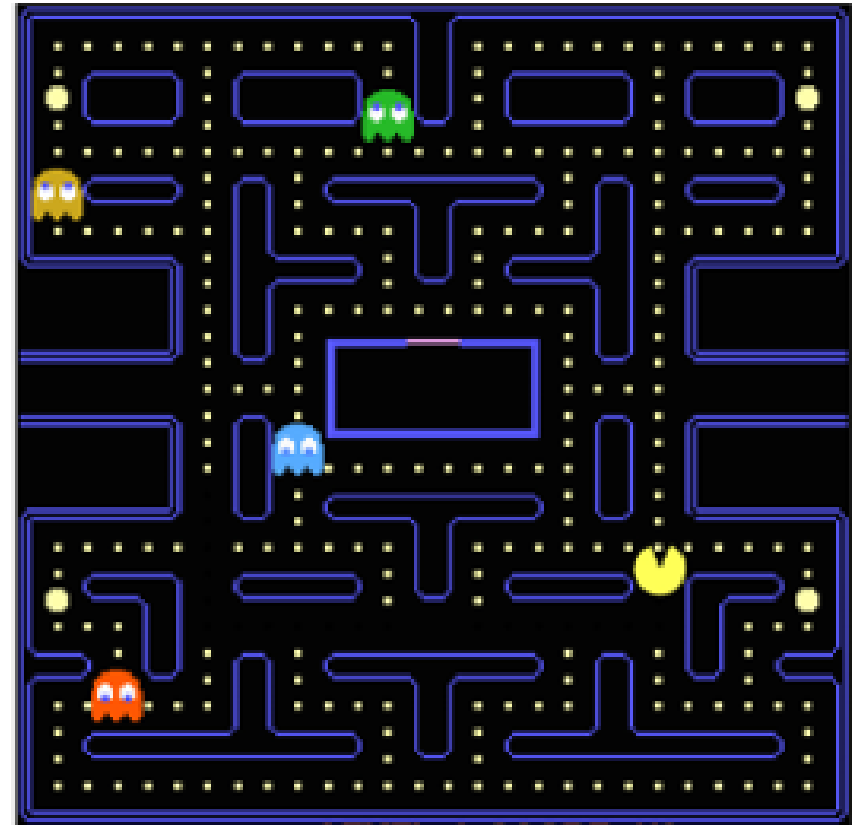
Year Groups

EYFS

Year 1

Year 2

Year 3

Daily 10

Click on the Paddox Tree to return to this page.

Year 4

Year 5

Year 6

CPA Explained

Parent Support

What is the CPA approach?

- CPA stands for Concrete, Pictorial and Abstract.
- Each element of CPA refers to how a child can approach, interpret and solve a mathematical problem.
- Concrete – Children are given concrete resources such as counters, bead strings and base 10 to help them solve problems.
- Pictorial – Children can use and draw pictures to help them solve problems. Examples of pictorial methods are arrays, tally marks and bar models.
- Abstract – Children use formal written methods and algebraic symbols to solve problems. Examples of abstract methods are column addition and subtraction.

Concrete   **Pictorial**   **Abstract**

Concrete

- The 'doing' stage
- Physically moving objects
- Bringing maths to life
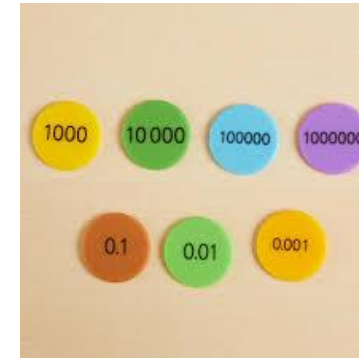
Pictorial

- The 'seeing' stage
- Images / diagrams used to represent the objects
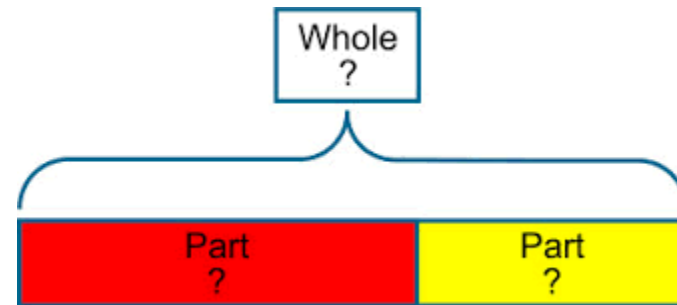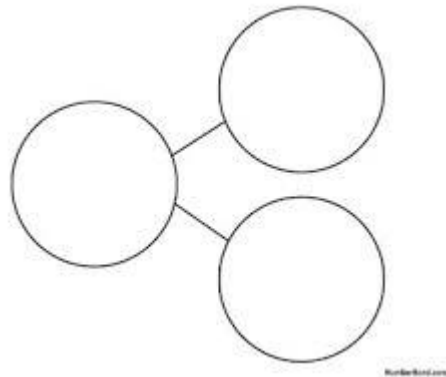
Abstract

- The 'abstract' stage
- Symbols and numbers are used to model the problem
- Operation symbols (**+** - x **÷)**

$$20 + 5$$
$$40 + 8$$
$$\overline{60 + 13} = 73$$

$$536$$
$$+ 85$$
$$\overline{621}$$
$$1\,1$$

$$47 - 24 = 23$$

$$40 + 7$$
$$-\ 20 + 4$$
$$\overline{20 + 3}$$

EYFS

In EYFS, children are taught how to read and write different numbers but explore mathematical concepts with lots of physical objects.
Click on the links below to explore the different examples and explanations of how your child will be taught Maths in EYFS at Paddox.

+
Addition

-
Subtraction

X
Multiplication

÷
Division

Maths Mastery in the EYFS

+
Addition

Children will add numbers with one digit numbers using objects and pictures.

e.g.

$$5 + 2 = ?$$

5 white beads + 2 red beads = 7 beads altogether

$$5 + 2 = 7$$

Children will subtract a single digit number from a single digit number or from 10, using concrete objects or pictures.

4 – 1 = ?
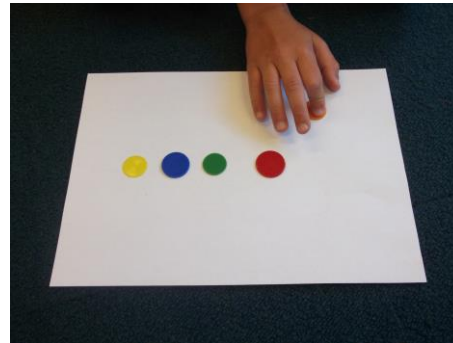
Your child will find 4 counters and then take one away. Then they will check how many counters they have left.

4 – 1 = 3

X
Multiplication

Children are not expected the learn their times tables in EYFS. Instead they will be introduced to multiplication by using repeated addition and using concrete objects.

2 + 2 + 2 = 2 x 3

2 + 2 + 2 =

2 + 2 + 2 = 6

2 x 3 = 6
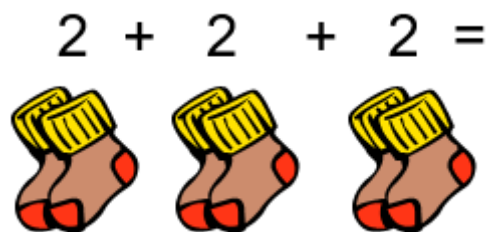
÷
Division

Children will be taught to share objects between equal groups and use pictures and objects to help them practise sharing.

E.g. 12 frogs shared between 3 lily pads.
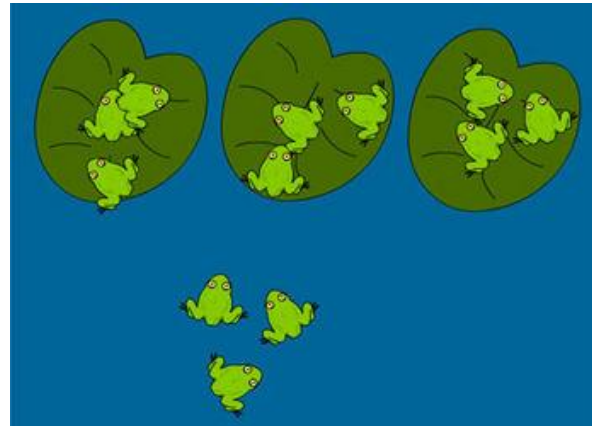
12 ÷ 3 = 4

4 frogs can fit on each lily pad.

In EYFS Maths Mastery uses a range of representations to support the teaching and understanding of mathematics. The model below best describe the style of teaching used in EYFS at Paddox.

Children are given a lot of opportunity to explore mathematical concepts with concrete resources and work with partners. Children can extend their learning through child initiated play and complete a focus group task based on that weeks learning.

Do now/ Fluency first — New Learning — Talk task or Let's explore — Develop learning — Independent task — Plenary

Child-initiated play
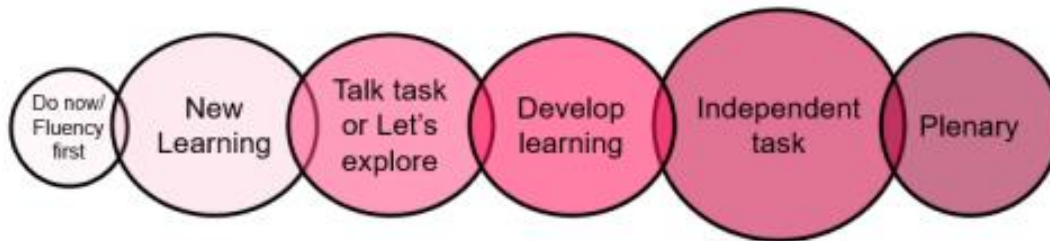
Adults plan the continuous provision to enable pupils to explore the key learning from the unit through child-initiated learning at a different time in the day.

Year 1

In Year 1, children build on the concrete skills they have been introduced to in EYFS. Concrete materials are available throughout the whole of Year 1 and is used as a key teaching tool to help enable children to progress and develop their understanding of numbers, patterns and mathematical relationships. Maths Mastery has many representations that our pupils will explore throughout their time in Year 1.

+ Addition	- Subtraction	X Multiplication	÷ Division

Maths Mastery Representations

+
Addition

Children will add numbers with two digits and one digit using previously taught methods and new concepts such as base ten, tens frames and number lines.

13 + 5 = 18

-
Subtraction
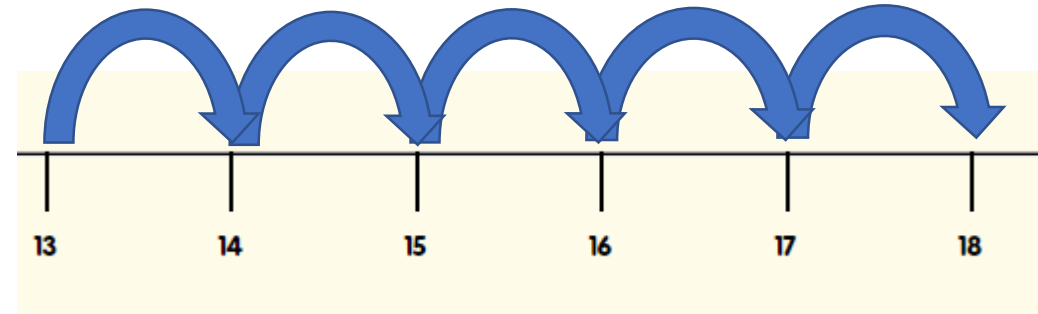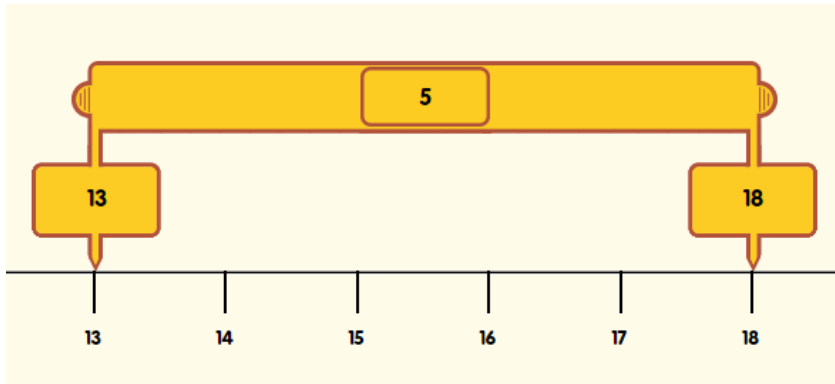
Children will subtract a one and two digit numbers to 20, using previously taught methods and concrete materials. They will also be introduced and develop the use of pictures and number lines.
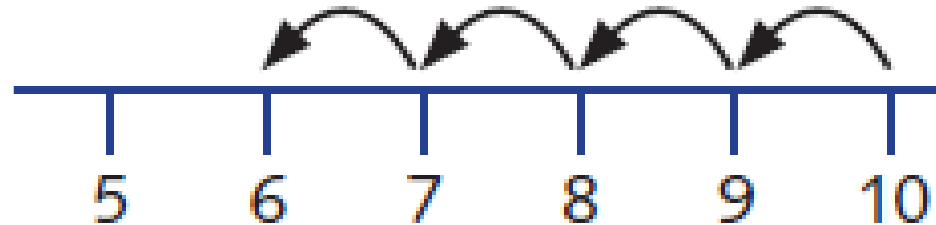
X
Multiplication

Children will learn to multiply through doubling and grouping small quantities and will begin to learn their 2, 5 and 10 times tables.
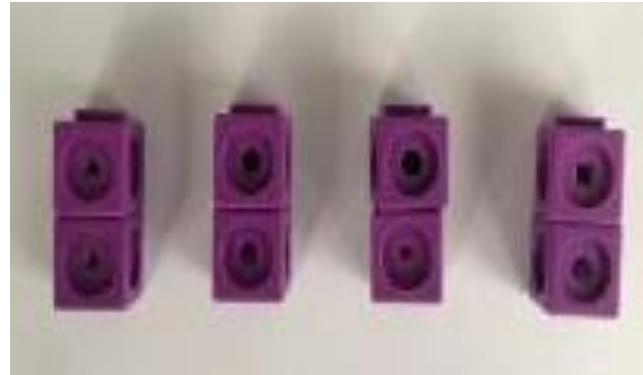
2 x 4 = 8

In this example a child has made 4 groups of 2.

But the child could also make 2 groups of 4 to find the answer.

(Some children may be introduced to the concept of an array to help them solve this problem.)

2

4

÷
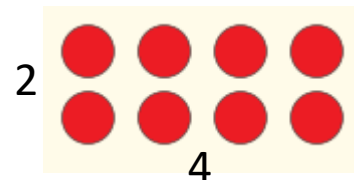
Division

Children will share quantities into small groups and recognise sharing in two groups as halving.
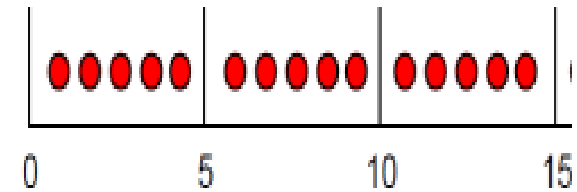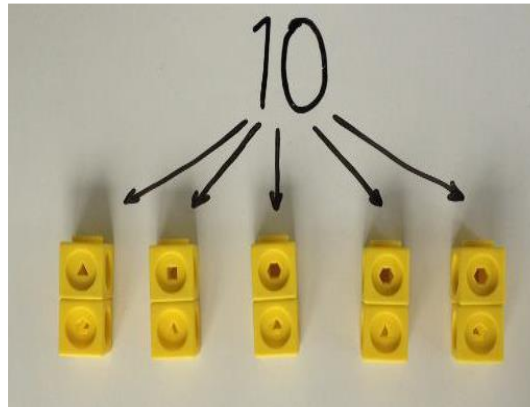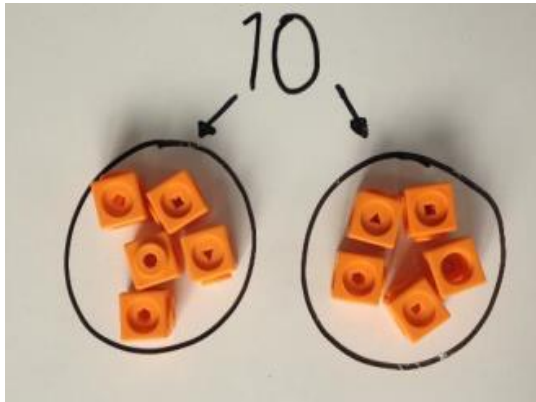
Year 1 Key Representations
Find out more…

Watch the **Unit tutorial** before planning each unit.

Read the **planning guides** for suggestions of representations.

Make use of **PD videos** on unit pages and Progression in Calculations page.

Representations of number

Pupils are most familiar with concrete representations of number within 20 which show one to one correspondence, such as cubes, counters, bead strings to 20 and other countable objects. They also recognise numerals and numbers to 20. A ten frame has been used to represent numbers and think about what this shows.

There are seven counters.
Seven is two more than five.
Seven is three less than 10.

There are 11 cubes. 11 is one more than ten.

Ordering numbers

Pupils have explored a number of ways to order and compare numbers practically using representations including a **number track** and a **number line**, within 20. These representations are used to secure counting within 20 and stating one more / one less.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Equations

The phrase 'is equal to' is used consistently to refer to the = symbol. What is on one side of the symbol is equal to what is on the other side. Present equations in different ways to support this:

$2 + 3 = 5$
$5 = 3 + 2$

Comparing numbers

Concrete representations are used to compare numbers, focusing on correct language use. The structure of the representation supports comparison: lining towers of cubes next to one another builds on one-to-one correspondence.

Five is **less than** seven. Five ones is **fewer than** seven ones.
Seven is **greater than** five.
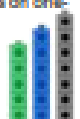
Representing numbers 11-20

Pupils say, read and write teen numbers. Pupils understand the ten and ones relationship of teen numbers, supported by representations.

There are fourteen cubes. This is written as 14. 14 is one ten and four ones.

Part-whole language and representations

Pupils will have had lots of experience partitioning numbers in different ways through exploring concrete representations. They may identify these as parts and should see that numbers can be split in different ways.

A part-whole model is used to represent number bonds, addition and subtraction. Pupils are familiar with the concept of a whole and partitioning this into two or more parts. They explore how to write this relationship as an equation.

5 — The whole is five. I can partition five into one part of three and one part of two.

5 — There are three people in one train carriage and two people in another. One part is three and one part is two. The whole is five.

whole = part + part
$5 = 3 + 2$

### Counting principles – conservation of number

A key number principle for developing addition and subtraction strategies is to understand that the same number of objects will always have the same value.

There are still seven counters. The position has changed but no counters have been added or taken away.

Counting principles – subitising

Subitising is the ability to identify a group of objects without the need to count. Pupils have explored this and should be confident in subitising up to five objects. Making use of patterns e.g. die faces, triangle shapes can support this.
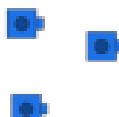
Doubling and halving

Pupils have had opportunities to represent doubling and halving within 20 practically using manipulatives and other countable objects. Some facts may be recalled and pupils may connect this with equal groups.

Double three is six. Three plus three is equal to six. Half of six is three.

Development of division

Pupils explore counting in equal groups using manipulatives or pictorial representations.

There are three equal groups of 10. 10, 20, 30. There are 30 altogether.

Pupils have explored the concept of equal and unequal grouping and sharing in context using concrete manipulatives.

15 cows can be grouped into five fields in this way. The groups are unequal.

If 15 bags of grain are shared equally between five farmers, each farmer gets three bags.

Developing fraction language

The foundations for fractions have been laid through exploration of half full / half empty and associated descriptions. Pupils have also explored doubling and halving without linking specifically to fractions.

The bottle is half full.
The bottle is half empty.

Addition and subtraction strategies

Pupils are familiar with addition and subtraction (taking away) using concrete and pictorial representations. A range of contexts for this have been explored. Pupils should be familiar with strategies including count all, count on and count back using representations.

I have four yellow cubes. I add two green cubes. I can count on from four: five, six. There are six cubes.

I have three red cubes and four purple cubes. I can put them together and count the whole. There are seven cubes.

I have five cubes. I can take away two: four, three. Five take away two is three.

Year 2

In Year 2, children will consolidate the skills they have learnt in EYFS and Year 1 but will transition to using more formal, abstract methods in Maths. However, concrete materials are still used by both teachers and children to support this transitional period.

+ Addition	**-** Subtraction	**X** Multiplication	**÷** Division

Children will add numbers with two digits using expanded written method.

38 + 25 = 63

24 + 15 = 39

44 + 15 = 59

-
Subtraction
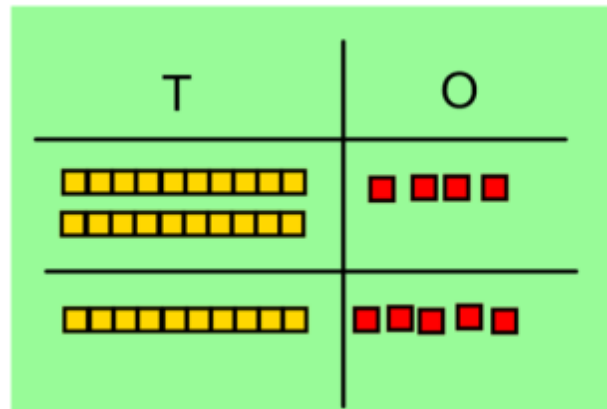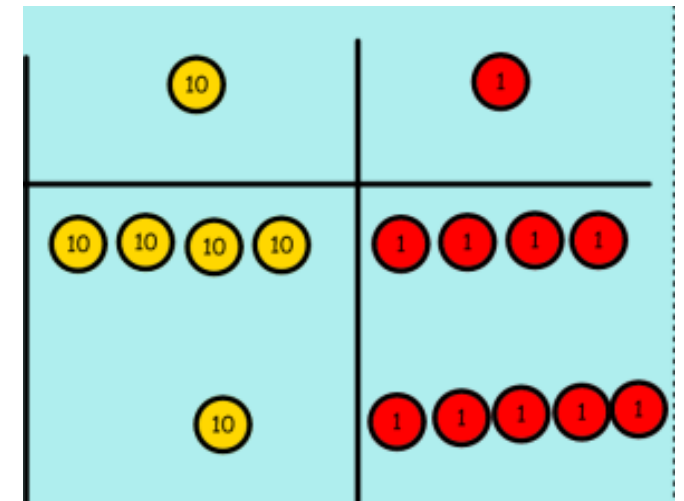
Children will subtract two, two-digit numbers (without exchanging), using partitioning followed by written method e.g.

87 – 32 = 55

Children can still use concrete materials as shown below:

X
Multiplication
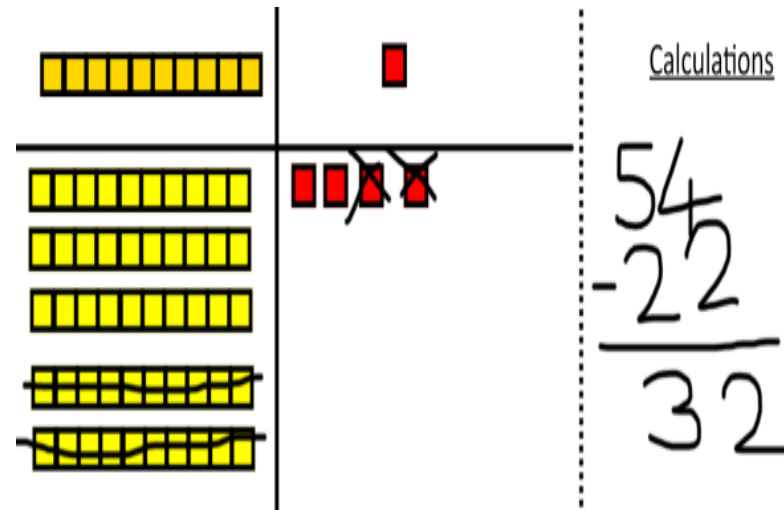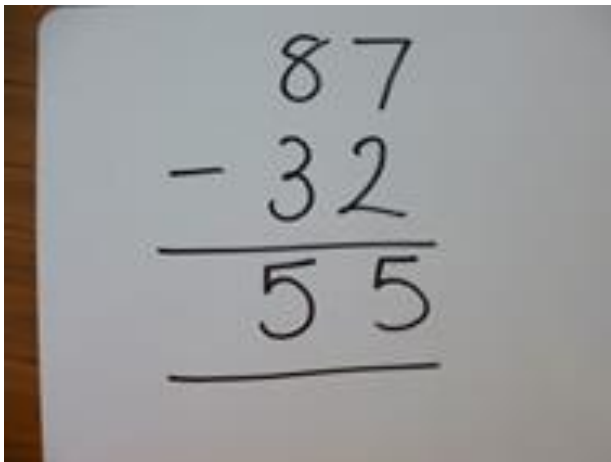
Children will continue learning their 2, 5 and 10 times tables and will be taught to multiply using arrays e.g.

5 x 4 =
5 lots of 4
or
4 lots of 5

4 x 5 = 20
5 x 4 = 20
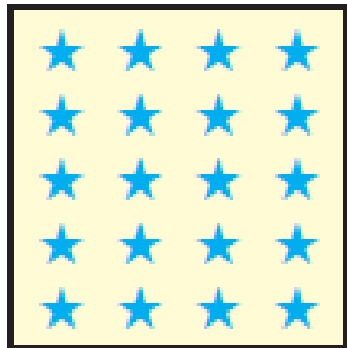
5 x 3 = 15

5 + 5 + 5 = 15

3 + 3 + 3 + 3 + 3 = 15

5 x 3 = 15
3 x 5 = 15

÷
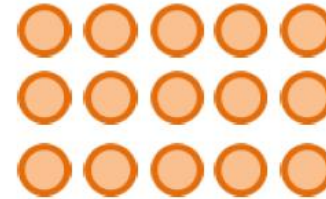
Division

Children will share and group between 2,5 and 10 using pictures, bar models and use repeated subtraction on number lines e.g.

$20 \div 5 = 4$
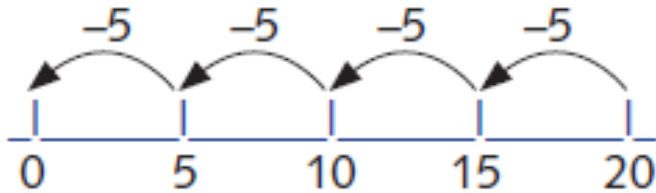
$20 \div 4 = 5$
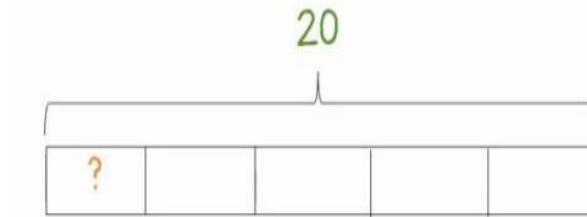
$20 \div 5 = ?$

$5 \times ? = 20$

Year 3

In Year 3, children are familiar with abstract methods and will continue to develop their mathematical understanding using abstract methods, with concrete resources to support where necessary.

+ Addition	- Subtraction	X Multiplication	÷ Division

+
Addition

Children add numbers with up to three digits using expanded written method followed by formal compact written method (supported with concrete materials if needed) e.g.

548 + 387 = 935

Expanded

Compact

146
+ 527

-
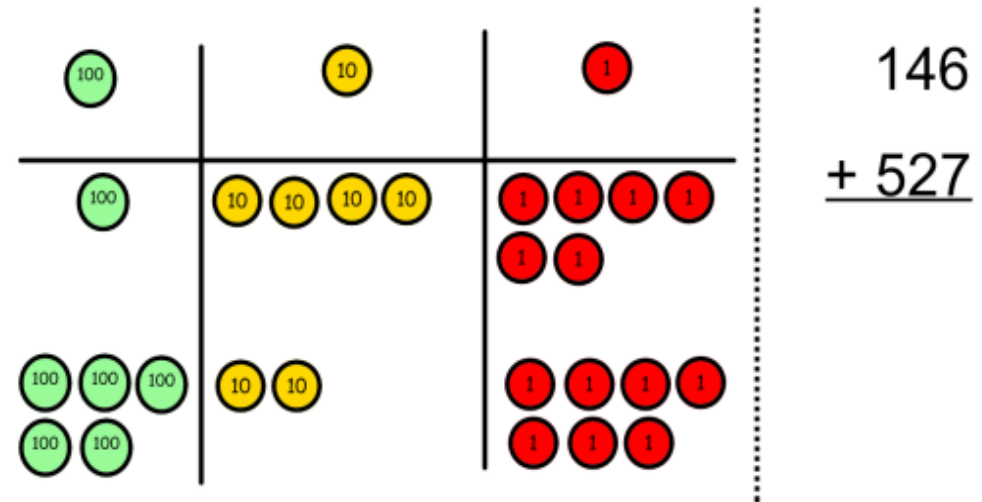
Subtraction

Children subtract two numbers with up to three digits which need exchanging, using the formal written method.

582 - 237 =

Here a child is using place value counters and exchanges one of the Ten counters for 10 One counters. This way they can subtract the 8 from the larger number whereas before they could not.
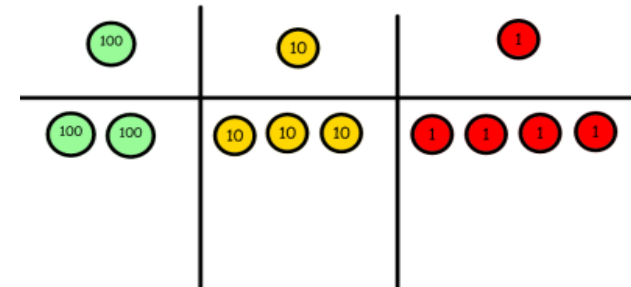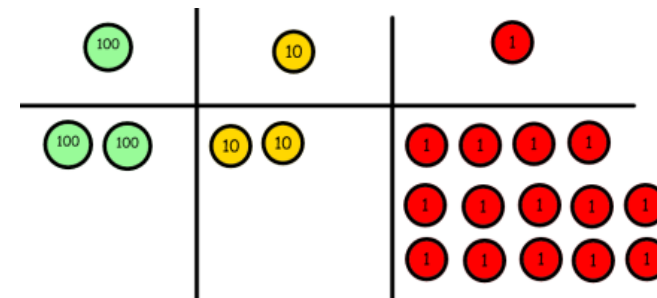
X
Multiplication

Children will continue to consolidate their understanding of their 2, 5 and 10 times tables and begin to learn 3, 4, 8 times tables. Children will learn to multiply a two-digit number by a one-digit number using grid method followed by expanded written method e.g.

63 x 8 =

Grid Method

Expanded Method

÷

Division

Children will divide a two-digit number by a one-digit number (without remainders) using the expanded written bus stop method and inverse of multiplication where possible e.g.

$$92 \div 4 =$$

Year 4

In Year 4, children will rely more on abstract methods for solving problems and will show their working out using a range of abstract, pictorial and abstract methods where appropriate.

+	-	X	÷
Addition	**Subtraction**	**Multiplication**	**Division**

+
Addition

Children will add numbers with up to four digits using formal compact written method. Including numbers involving money e.g.

2456 + 5378 = 7834

£23.59 + £7.55 = £31.14


```
    2 4 5 6
 +  5 3 7 8
 ─────────
    7 8 3 4
      1 1
```

```
   £  2  3  .  5  9
 + £     7  .  5  5
 ──────────────────
   £  3  1  .  1  4
      1  1     1
```

-

Subtraction

Children will subtract two numbers with up to four digits which need exchanging including money, using the formal written method.

6418 – 2546 = 3872

Children will multiply a two-digit or three-digit number by a one-digit number using formal written method for short multiplication. Children will also consolidate and learn all of their times tables (up to 12) in preparation for the Government's 'Times Table Test'.

356 x 7 = 2492

Children will divide a two-digit or three-digit number by a one digit number (without remainders) using the formal written bus stop method e.g.

486 ÷ 9 = 54

Year 5

In Year 5, children will rely mainly on abstract methods for solving problems and will show their working out using a range of abstract, pictorial and abstract methods where appropriate.

+	-	X	÷
Addition	**Subtraction**	**Multiplication**	**Division**

+
Addition

Children will add numbers with more than four digits and decimals with up to two decimal places using formal compact written method e.g.

14623 + 11324 =

56.47 + 84.86 =

- Subtraction

Children will subtract two numbers with more than four digits and subtract decimals with up to two decimal places e.g.

45257 – 17488 = 27769

83.72 – 36.49 = 47.23

X
Multiplication

Children will use knowledge of times tables up to 12 x 12 to derive related multiple facts and Multiply **up to** four-digit numbers by one digit numbers using formal written method for short multiplication. Children will multiply **up to** three-digit numbers by two-digit numbers using formal written method for long multiplication e.g.

378 x 4= 1512

78 x 34 = 2652

÷

Division

Children will divide up to four-digit numbers by a one digit number (with remainders as whole numbers, fractions and decimals) using the formal written bus stop method e.g.

$$279 \div 6 = ?$$

(Remainder)   (Fraction)   (Decimal)

Year 6

In Year 6, children will rely mainly on abstract methods for solving problems and will show their working out using a range of abstract, pictorial and abstract methods where appropriate.

+ Addition	**-** Subtraction	**X** Multiplication	**÷** Division

+
Addition

Children will add numbers with more than four digits and decimals with **up to** three decimal places using formal compact written method e.g.

$456287 + 359849 = 816136$

$57.486 + 45.378 = 102.864$

-
Subtraction

Children subtract two numbers with more than four digits and will subtract decimals with **up to** three decimal places e.g.

746291 – 298354 = 447937

63.237 – 45.869 = 17.368

X
Multiplication

Children will use knowledge of times tables up to 12 x 12 to derive related multiple facts and related decimal facts.

Children will multiply **up to** four-digit numbers by two-digit numbers using formal written method for short multiplication.

Multiply **up to** one-digit with up to two decimal places by a two-digit number using formal written method for short multiplication e.g.

285 x 63 = 17955   7.56 x 12 =

÷

Division

Children will divide up to two decimal places by a two-digit whole number using the formal written bus stop method. Children will be encouraged to think about how they can make harder calculations as show below easier using their understanding of place value e.g.

58.32 ÷ 18 = 3.24

Daily 10

Daily 10 is part of the school day where children in Year 1- 6 take 10 minutes to practise developing their fluency skills.

This has been very successful so far. We are now adapting how we use Daily 10 to help support our problem solving skills.

Now our Daily 10 sessions look like this:

Session 1	Session 2	Session 3	Session 4	Session 5
Fluency skills	Fluency skills	Fluency skills	Problem Solving experience	Problem Solving explanation

A great tool to support this is: https://www.topmarks.co.uk/maths-games/daily10
The level is reflective of the year a child is in e.g. Level 1 = Year 1.

Parent Support

At Paddox we follow 'White Rose Maths', there is lots of support from White Rose for both teachers and parents. If you click on the link you will see that there are some helpful videos and free resources to support maths at home. https://whiterosemaths.com/for-parents/

Maths with Michael

Top tips from Michael Underwood

Home Learning

FREE home learning videos

Advice and Guidance
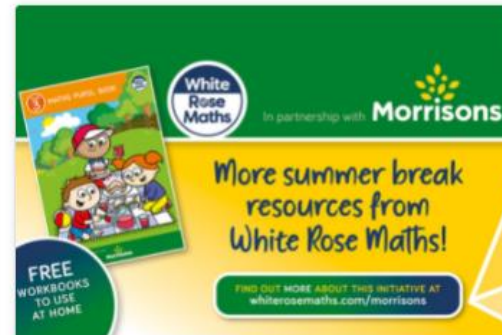
Find out more about White Rose Maths

Free Printable Booklets

Free to download, engaging workbooks for each topic

Printed Workbooks

Low cost printed workbooks

Free Parent Workbooks

We've partnered with Morrisons to provide free workbooks for the summer break!