



# MATHS AT SOUTH HILL

## PARENT WORKSHOP



# Concrete, Pictorial and Abstract (CPA)



Each of the teaching sequences here at South Hill focus on a three-tiered process of learning.

Concrete – The initial phase of any new learning is centred around the use of objects and manipulatives.

Pictorial – Secondly, children begin to show representations of numbers and problems through pictures and diagrams.

Abstract – Also known as the ‘symbolic’ phase, the abstract process is a more formal, written representation of a calculation.

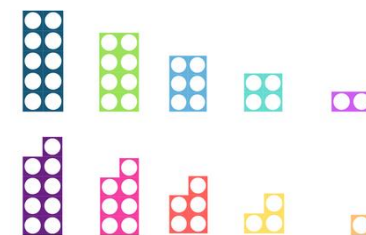
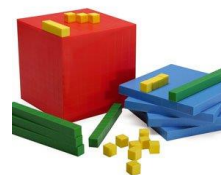
## Why use these approaches?

The CPA approach brings Maths to ‘life’ by allowing children to experience and handle objects/concrete materials before moving on to traditional written methods.

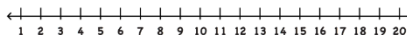
Throughout learning children will go back and forth through the CPA stages reinforcing understanding.

# Resources your child will use

- ❖ Dienes (“base ten”)
- ❖ Numicon/tens frames
- ❖ Bead strings
- ❖ Number lines
- ❖ Multi link
- ❖ Counting bears
- ❖ Hundred square
- ❖ Cuisenaire
- ❖ ...



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



# Resources you could use at home



**Pennies**



**Grapes**



**Sweets**



**Pebbles or stones**

**Pasta pieces**





# Maths in the Early Years

- ❖ In Reception we teach Maths 4 times a week, however mathematical learning opportunities are available across the indoor and outdoor provision, which children can access every day – water play (capacity), construction (shape and space), sand play (capacity), playdoh (shape, measure)
- ❖ We build strong foundations of mathematical understanding and work towards children achieving the Early Learning Goals by the end of the year.
- ❖ Children explore mathematical concepts through stories, songs and rhymes, concrete resources and games.



# Maths in the Early Years



- ❖ The Maths Early Learning Goals are ‘Number’ and ‘Numerical Patterns’
- ❖ Children who achieve these goals by the end of Reception will have a strong understanding of the key mathematical skills and concepts, which will be built upon in Key Stage 1.

Number ELG: Have a deep understanding of number to 10, including the composition of each number

Number ELG: Subitise (recognise quantities without counting) up to 5.

Number ELG: Automatically recall (without reference to rhymes, counting or other aides) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.



Numerical Patterns ELG: Verbally count beyond 20, recognising the pattern of the counting system.

Numerical Patterns ELG: Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as another quantity.

Numerical Patterns ELG: Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

# Maths in the Early Years



## 'Multiplication and division'

- ❖ We build the foundations of early multiplication and division through sharing equally, using groups and counting in 2s.
- ❖ Children practically apply what they know by placing spots on ladybirds for doubling, using mirrors to double, cutting fruit in  $\frac{1}{2}$ , halving groups of children and working on odds and evens using apparatus.

# Multiplication CPA KS1



Array				
Describe it	4 lots of 2	6 groups of 2	5 lots of 2	7 lots of 2
Repeated addition +	$\begin{array}{r} 2 + 2 \\ 2 + 2 \end{array}$	$2 + 2 + 2 + 2$ + 2 + 2 ✓	$2 + 2 + 2$ + 2 + 2 ✓	$2 + 2 + 2$ + 2 + 2 + 2 + 2 ✓
Total	8 ✓	12 ✓	10 ✓	14 ✓

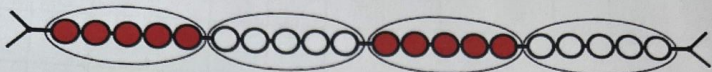
- ❖ Year 1 – counting in 2s, 5s, 10s, lots of, groups of, arrays, repeated addition
- ❖ Year 2 – grouping, timestables 2, 5, 10, lots of, repeated addition, multiples, product, commutativity (any order)



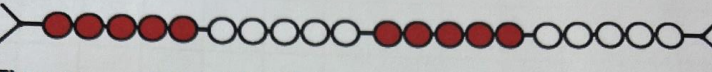
# Key Stage 1 multiplication



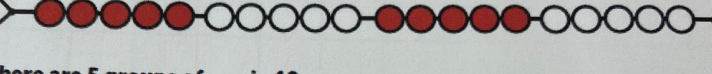
There are \_\_\_ groups of 5 in 20.



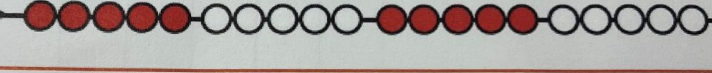
There are \_\_\_ groups of 10 in 20.



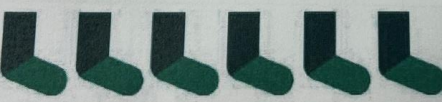
There are \_\_\_ groups of 2 in 16.



There are 5 groups of \_\_\_ in 10.

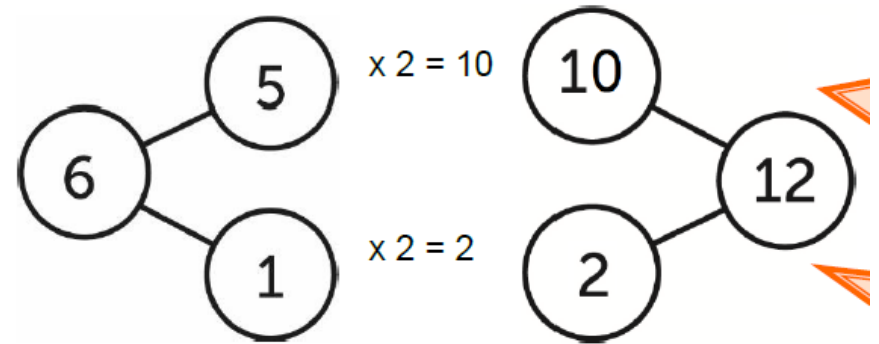


Sam has 6 socks. How many pairs of socks can he make?



Jane had thirty, 1p coins. She put them into groups of 10 to change for 10p coins.

How many 10p coins did she get?



Regrouping to aid multiplication  
(flexible thinking)

$$6 \times 2 =$$

$$5 \times 2 = 10$$

$$1 \times 2 = 2$$

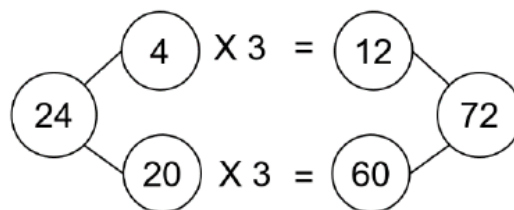
# Progression of multiplication



YEAR 3  $24 \times 3$   
Concrete



Pictorial - Jottings

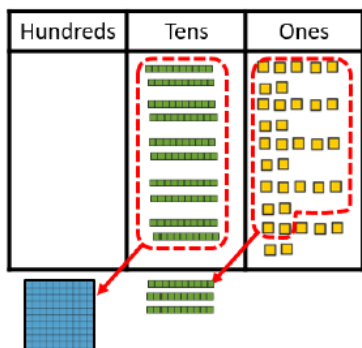


Abstract - Written symbolic

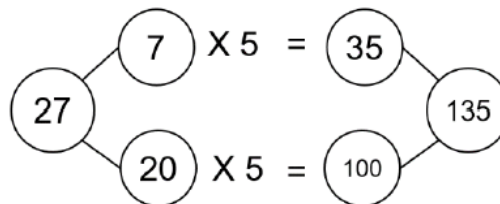
$$\begin{array}{r}
 24 \\
 \times 3 \\
 \hline
 72 \\
 \hline
 1
 \end{array}$$

$$24 \times 3 = 72$$

Concrete



Pictorial - Jottings



Abstract - Written symbolic

$$\begin{array}{r}
 27 \\
 \times 5 \\
 \hline
 135 \\
 \hline
 3
 \end{array}$$

$$27 \times 5 = 135$$

# Progression of multiplication

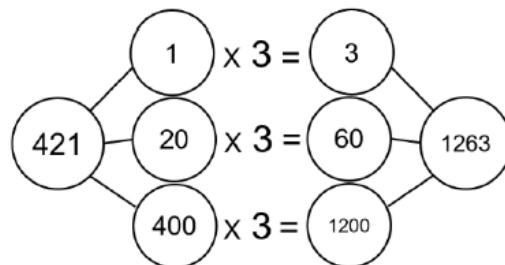


## YEAR 4

### Concrete



### Pictorial - Jottings



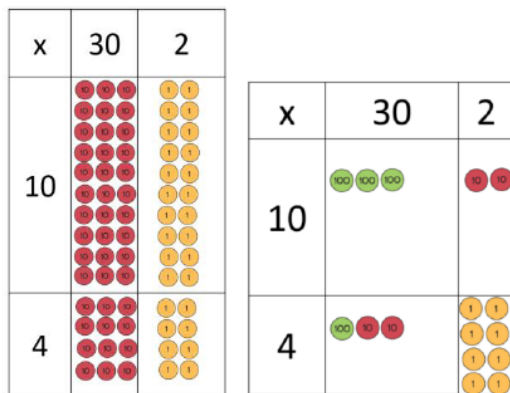
### Abstract - Written symbolic

$$\begin{array}{r} 421 \\ \times \quad 3 \\ \hline 1263 \end{array}$$

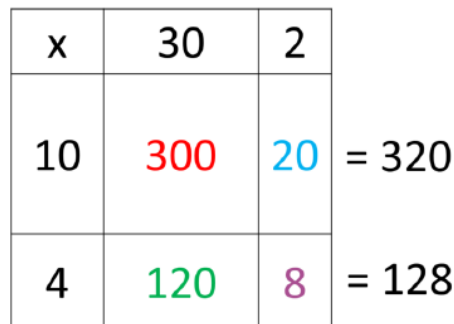
$$421 \times 3 = 1263$$

## YEAR 5

### Concrete



### Pictorial - Jottings



### Abstract - Written symbolic

$$\begin{array}{r} 32 \\ \times 14 \\ \hline 128 \\ 320 \\ \hline 448 \end{array}$$

$$32 \times 14 = 448$$

# What do I already know?



- ❖ We encourage children to use their 'what do I already know' facts to aid solving larger number problems.
- ❖ Multiplying and dividing by 10, 100 and 1000 is very important for using the 'what do I already know' skill to help solving larger number problems.
- ❖  $\times$  and  $\div$  by 10, 100, 1000 – WE MOVE THE DIGIT PLACE VALUE – we do not 'add' or 'take away zeros' – this doesn't work with decimals nor is the correct vocabulary
- ❖  $\times$  and  $\div$  by 10, 100 & 1000 is a skill that children should be fluent in.



# What do I already know?



x	1000	000	70	4
20	20,000	0	1,400	80
2	2000	0	140	8

I know that  $2 \times 4 = 8$ .

So I also know that  $20 \times 4 = 80$ .

I know that  $2 \times 7 = 14$ .

So I also know that  $20 \times 70 = 1400$ .

I know that when you multiply by 0, the answer is always 0.

I know that  $20 \times 1 \text{ thousand} = 20 \text{ thousand}$ .

$$\begin{array}{r} 1074 \\ \times 22 \\ \hline 8 \\ 140 \\ 000 \\ 2000 \\ 80 \\ 1400 \\ 0000 \\ 20000 \\ \hline 23628 \end{array}$$

$$\begin{array}{r} 1074 \\ \times 22 \\ \hline 2148 \\ \phantom{2148}1 \\ \hline 21480 \\ \phantom{21480}1 \\ \hline 23628 \\ \phantom{23628}1 \end{array}$$

# Division CPA KS1



❖ Year 1 – counting in 2s 5s, 10s, odds and evens, equal and unequal groups

❖ Year 2 – sharing, grouping, timestables 2, 5, 10, linking multiplication to division, remainders

I have 12 cakes to share equally between 5 boxes.  
When I fill the boxes, I will have 1 cake left over.

True or False?



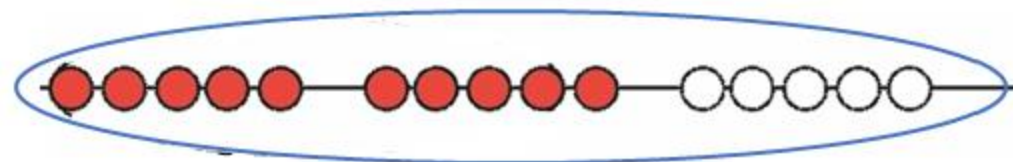
Prove it.

$$15 \div 3 = 5$$

$$15 \div 5 = 3$$

$$5 \times 3 = 15$$

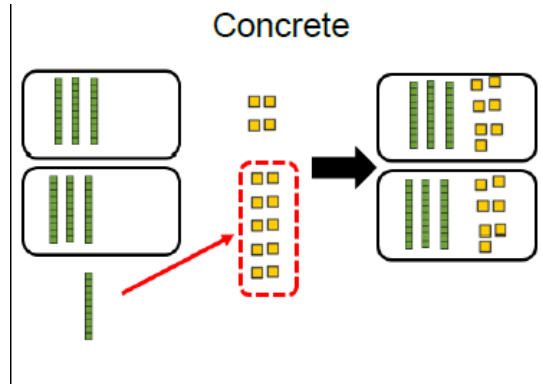
$$3 \times 5 = 15$$



# Division Progression



YEAR 3



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} 37 \\ 2 \overline{) 74} \\ \underline{- 6} \phantom{0} \\ 14 \\ \underline{- 14} \\ 0 \end{array}$$

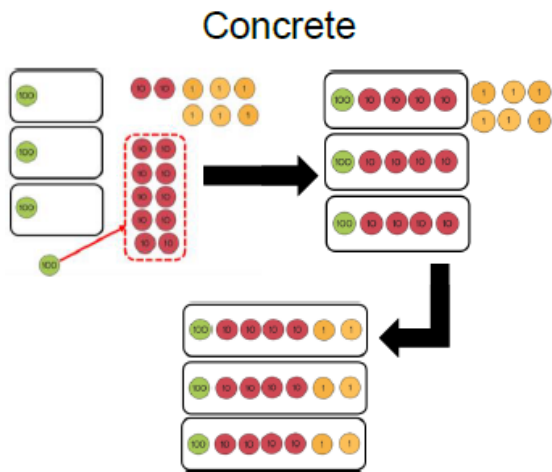
$$74 \div 2 = 37$$

First, I am sharing ... tens into ... equal groups.  
There are ... tens in each group.  
I have ... ten(s) remaining.  
I need to regroup the remaining ... ten(s) into ... ones.  
I now have ... ones in total.  
Then, I am sharing ... ones into ... equal groups.  
There are ... ones in each group.  
I have ... one(s) remaining.  
The quotient is ... with ... remainders.

# Division Progression



YEAR 4

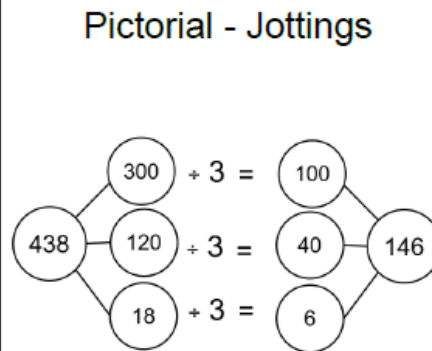
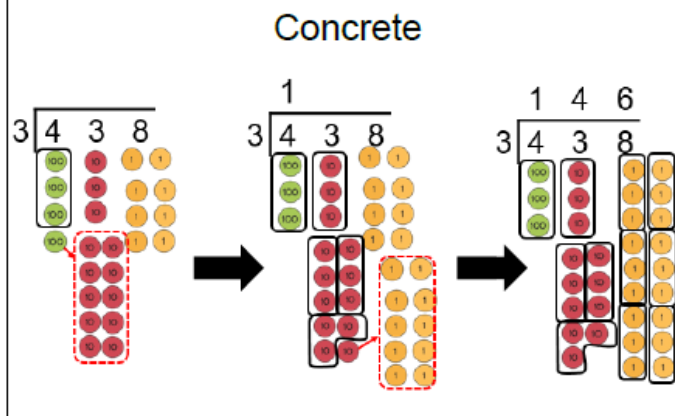


Abstract - Written symbolic

$$\begin{array}{r} 142 \\ 3 \overline{) 426} \\ \underline{3} \phantom{00} \\ 12 \phantom{0} \\ \underline{9} \phantom{0} \\ 36 \\ \underline{36} \\ 0 \end{array}$$

$$426 \div 3 = 142$$

YEAR 5



Abstract - Written symbolic

$$\begin{array}{r} 146 \\ 3 \overline{) 438} \\ \underline{3} \phantom{00} \\ 13 \phantom{0} \\ \underline{9} \phantom{0} \\ 48 \\ \underline{48} \\ 0 \end{array}$$

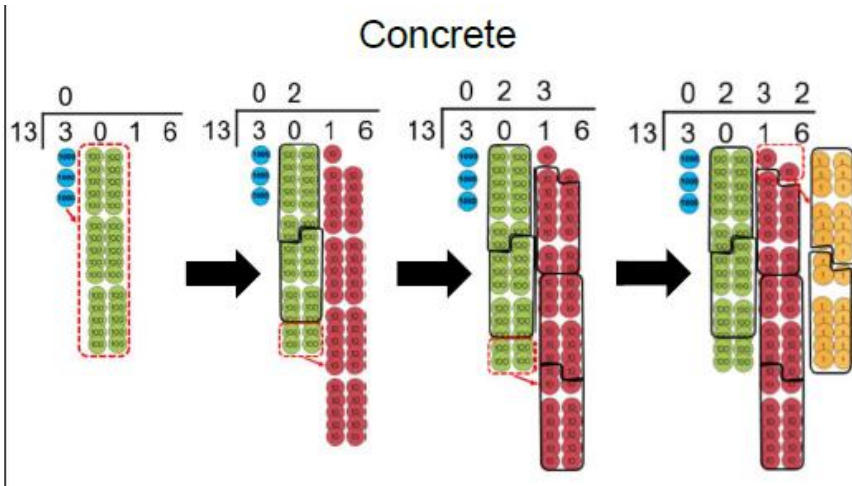
$$438 \div 3 = 146$$



# Division Progression



YEAR 6



**Pictorial - Jottings**

*Jottings: multiples of the divisor*

- 13
- 26
- 39
- 52
- 65
- 78
- 91
- 104

**Abstract - Written symbolic**

$$\begin{array}{r}
 \begin{array}{cccc}
 & 0 & 2 & 3 & 2 \\
 13 & \overline{) 3016} \\
 - 0 & & & & \\
 \hline
 & 3 & 0 & & \\
 - 2 & 6 & & & \\
 \hline
 & & 4 & 1 & \\
 - & & 3 & 9 & \\
 \hline
 & & & 2 & 6 \\
 - & & & 2 & 6 \\
 \hline
 & & & & 0
 \end{array}
 \end{array}$$

3016 ÷ 13 = 232

# Timestables



- ❖ TTRS
- ❖ Hit the button
- ❖ Year 1 – count in multiples of 2s, 5s and 10s
- ❖ Year 2 – 2s, 5s, 10s – multiplication and division facts
- ❖ Year 3 – 3s, 4s & 8s - multiplication and division facts
- ❖ Year 4 – up to 12 x 12 - multiplication and division facts
- ❖ Year 5 and 6 – fluency, speed, recall, application
  
- ❖ MTC in Year 4 – June – 25 questions up to 12 x 12 (5 seconds per question)

# The importance of vocabulary



## MULTIPLICATION AND DIVISION

lots of, groups of  
times, multiply, multiplication, multiplied by  
multiple of, product  
once, twice, three times... ten times...  
times as (big, long, wide... and so on)  
repeated addition  
array, row, column  
double, halve

share, share equally  
one each, two each, three each...  
group in pairs, threes... tens  
equal groups of  
divide, division, divided by, divided into  
remainder  
factor, quotient, divisible by  
inverse

## Counting in Multiples Speaking Frame

**We are using ..... to count in multiples of  $\square$**

**The  $\square$  multiple of  $\square$  is  $\square$**

**This could also be  $\square + \square + \square + \square \dots$**

**$\square$  groups of  $\square$  is  $\square$**

**This is also  $\square \times \square =$**

Each step of learning is supported by a speaking frame. Here we have an example of how to explain multiplication within groups.

This list is the end of KS2 words list for multiplication and division.

# Maths at home



## **Have fun with maths**

Play games that involve numbers, such as bingo, dice, card games and board games. Play 'Guess My Shape' – you think of a shape, and your child asks you questions in order to guess the shape. You can only answer 'yes' or 'no'. Whatever your age, songs can be an enjoyable way of practising number skills. Try a backwards counting song like '5 little ducks', '10 in a Bed'.

## **Read together**

Reading a book together is a great chance for your child to talk about the maths they can see on the page when reading. As well as this, lots of traditional tales and rhymes lend themselves to activities beyond the book. You could use modelling dough to make currant buns as in 'Five Currant Buns in the Baker's Shop', or make models of the animals used to pull Cinderella's coach and put them in order by size. Use building blocks to build a house for the little pigs and focus on the use of first, second, third etc. Or you could make a tower for Rapunzel and talk about how many bricks and which colour(s) you used.

## **Talk about maths**

Talking with your child about maths is important for building confidence. Whenever you can, try to talk about how you use maths in everyday life. Talking about recipes is a great way of doing this – you can count and measure ingredients, or, for example, share out banana slices equally between cakes and tomatoes equally between kebab sticks. You can also help your child to follow instructions, understanding first, second, third etc, or you could set a timer and talk about the amount of time needed to complete a recipe.

When you do the washing, separate items of clothing: all the socks in one pile, shirts in another, and trousers in another. Divide the socks by colour and count the number of each. Ask your child to sort their toys into groups, then ask them to tell you how they sorted them.

## **Practise number skills**

As your child's understanding and knowledge of number develops, ask them to count in 2s, 5s and 10s. Ask them to sort objects, making groups of 3, 4, 5 or 6 things. Then ask them to make '8' in as many ways as they can (e.g. 4 and 4; 5 and 3; 2 and 6). Play matching games with number fridge magnets and objects. Match the fridge magnet to the correct number of things (e.g., the '8' magnet with 8 objects). Ask your child to look at dominoes and find all the ones that have a certain total: 'Find all the dominoes that have 10 dots altogether.' Then ask them to find a domino with more or less than that number of dots.



# Maths at home



## **Measure up**

Help your child to practise using a ruler for drawing straight lines and measuring. Make a picture using straight lines. Help your child to hold the ruler carefully as they draw. Play 'How Long?' or 'How wide?'. Work together to measure the length or height of everyday objects in the house (in metres or centimetres). Point out the starting and finishing number on the ruler and read the measurement together. Help your child line the object up with the 0 on the ruler or tape when they measure.

Order objects by height or length and use the words 'longer/taller than', 'shorter than', 'longest/tallest' and 'shortest'. Choose some items from your kitchen cupboard. Weigh them together and put them in order. Use the words 'heavier than', 'lighter than', 'heaviest' and 'lightest'.

## **Practise times tables**

Start with the 2, 5 and 10 times tables then the 4s, 8s, 11s, 3s, 6s, 9s and 7s and 12s are the preferred order! You can help your child by showing them real-life examples of a times table. For example, a muffin tin will normally have four rows of three muffin cups each, showing the multiplication  $4 \times 3$ . Find opportunities to sing and chant times tables together, for example, in the car or on the walk to school. Play TTRS regularly.

## **Use maths in everyday life**

Build your child's confidence in mathematics by talking about and using maths together. You could measure ingredients for recipes together, using scales to do so. You could look at the clock together: 'If the party is at 5 o'clock we need to leave in half an hour. That'll be half past 4.' You could talk about how much things cost, paying and getting change when you go shopping. If you are making a picnic or snack together, you could talk about how many people are eating and how food items can be shared out equally. Make fruit drinks and talk about how much fruit juice there is compared to water: 'We put in a little bit of juice. Then we topped up with water. We put in about 10 times more water than juice.'

## **Have fun with fractions**

Cake, pizza, or any foods with a regular shape can help children understand what fractions are and how they work. Ask your child questions like, 'If I cut our cake into 8 pieces, what fraction will each piece be?' Foods that people might eat a few of are good for helping your child to understand how to find fractions of amounts: 'We've 12 fish fingers in the packet. There are 4 of us. What fraction of the fish fingers can we each have? How many fish fingers would that be?'

# Useful online resources



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[www.topmarks.co.uk](http://www.topmarks.co.uk)

[www.ictgames.co.uk](http://www.ictgames.co.uk)

<http://www.bbc.co.uk/bitesize>

<https://www.topmarks.co.uk/maths-games/hit-the-button>

<https://whiterosemaths.com/1-minute-maths#download>

(White Rose 1-minute maths app)

<https://home.oxfordowl.co.uk/kids-activities/fun-maths-games-and-activities/>



Thank you for your attendance.

Please feel free to join your child in their class as they show Maths in action.

If you have any questions, please do not hesitate to ask.