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# Rufford Primary School

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## Written Calculation Policy



January 2017

# Vocabulary

<b>Addition +</b>	<b>Subtraction -</b>
Add Altogether Count On Increase More Than Plus Put Together Sum Total	Decrease Difference Between Distance Between Fewer Less Than Minus Reduce Subtract Take Away Take From
<b>Multiplication x</b>	<b>Division ÷</b>
Array Grouping Groups Of Lots Of Multiply Product Sets Of Times	Divide Divisible By Divide Into Group Share Share Equally Sharing
<b>Equals =</b>	
Balance Equal To Same As Same Value	

Maths questions which use +, -, x and ÷ are called calculations (not sums).

The word sum is only used to describe addition calculations.

# Aims of the National Curriculum

The National Curriculum for mathematics aims to ensure that all pupils:

- ◆ Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply their knowledge rapidly and accurately.
- ◆ Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- ◆ Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

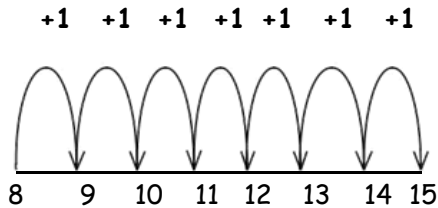
## **Our calculation policy**

This calculation policy has been written specifically with our children in mind. Please use this to help your children at home. We have all been taught maths in different ways- this is how we do it here! Ask your children which methods they have been taught within this policy.

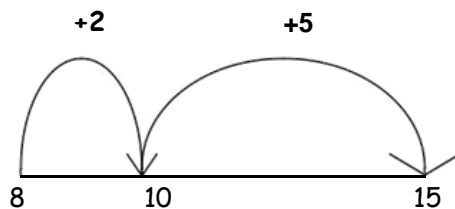
Any questions, please ask your child's teacher.

# Steps in Addition

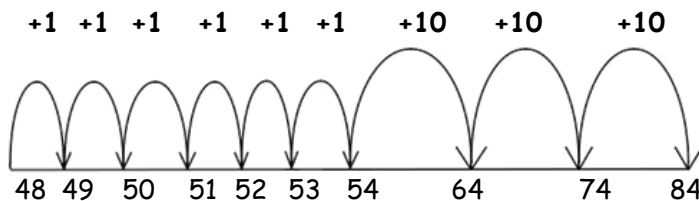
Lots of practical and verbal adding games or activities



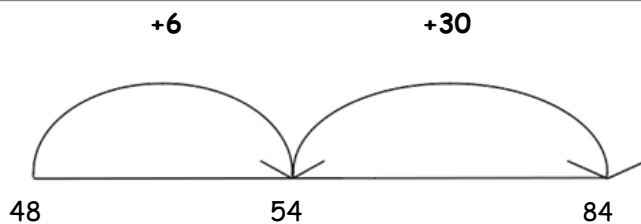
$$8 + 7 = 15$$



Bridging through  
 $10 + 8 = 18$



Add ones (units) first  
 $48 + 36 = 84$



Add ones (units) first  
 $48 + 36 = 84$

$$\begin{array}{r} 48 \\ + 36 \\ \hline 70 \\ + 14 \\ \hline 84 \end{array}$$

Add ones (units) first 14 (8 + 6)  
 (40 + 30)

$$\begin{array}{r} 48 \\ + 36 \\ \hline 84 \end{array}$$

Add ones (units) first 84

# Steps in Addition

Any questions, please see your child's maths teacher.

## Top tips for addition

- Subtraction should be taught alongside addition from Reception as the inverse.
- Children should begin to use the correct vocabulary from Reception
- Addition can be done in any order.
- Always start at the ones (units).
- Check addition with subtraction. This is called using the inverse operation and children should know this from Reception.

E.g.  $8 + 7 = 15$

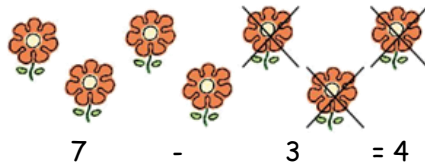
$$7 + 8 = 15$$

Check using the inverse:

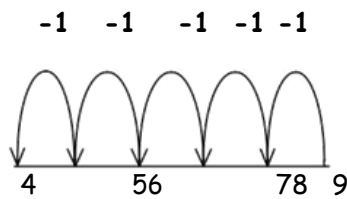
$$15 - 7 = 8 \quad 15 - 8 = 7$$

# Steps in Subtraction

Lots of practical and verbal subtraction games or activities

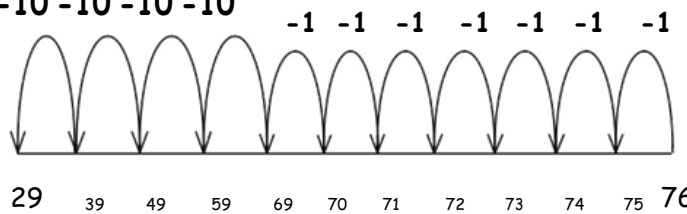


Counting backwards



$$9 - 5 = 4$$

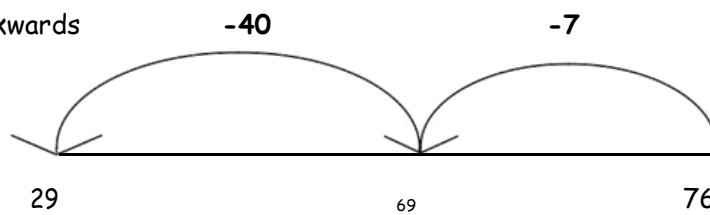
Counting backwards -10 -10 -10 -10



Subtract ones (units) first

$$76 - 47 = 29$$

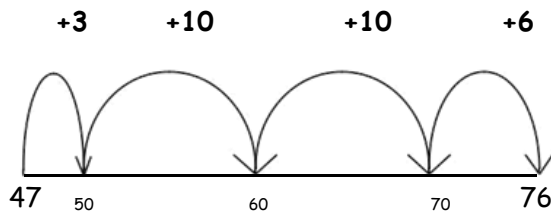
Counting backwards



Subtract ones (units) first

$$76 - 47 = 29$$

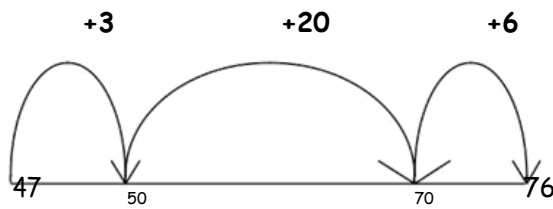
Counting forwards instead of counting backwards



$$76 - 47 = 29$$

# Steps in Subtraction

Counting forwards



$$76 - 47 = 29$$

$$\begin{array}{r} 76 \\ - 45 \\ \hline 31 \end{array}$$

(Without exchanging)

$$\begin{array}{r} \overset{6}{/} \overset{1}{76} \\ - 47 \\ \hline 29 \end{array}$$

Subtract ones  
(units) first

(With exchanging)

Any questions, please see your child's maths teacher.

## Top tips for subtraction

- Addition should be taught alongside subtraction from Reception as the inverse.
- Children should use the correct vocabulary from Reception.
- Always start at the ones (units).
- Check subtraction with addition. This is called using the inverse operation and children should know this from Reception.

E.g.  $76 - 47 = 29$

$$76 - 29 = 47$$

Check using the

inverse:  $29 + 47 = 76$

$$47 + 29 = 76$$

# Steps in Multiplication

Lots of practical and verbal multiplication games and activities

Doubling

$2+2=4$

$2 \times 2 = 4$

Array

$4 \times 2 = 8$

$2 \times 4 = 8$



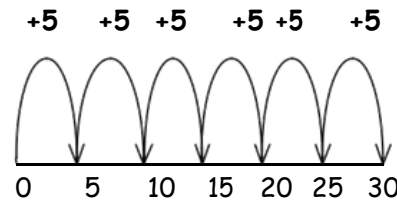
$2 + 2 + 2 + 2 = 8$

$4 + 4 = 8$

4 lots of 2 = 8

2 lots of 4 = 8

Repeated addition



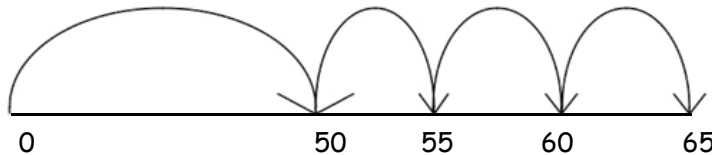
$6 \times 5 = 30$

$10 \times 5$

$1 \times 5$

$1 \times 5$

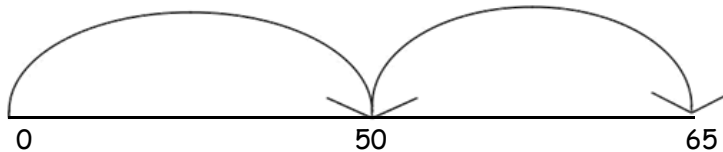
$1 \times 5$



$13 \times 5 = 65$

$10 \times 5$

$3 \times 5$



$13 \times 5 = 65$

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 56 \quad (7 \times 8) \\ 210 \quad (7 \times 30) \\ \hline 266 \end{array}$$

leading to short multiplication

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 266 \\ 5 \end{array}$$



# Steps in Multiplication

leading to long multiplication

$$\begin{array}{r} 45 \\ \times 27 \\ \hline 35 \quad (7 \times 5) \\ 280 \quad (7 \times 40) \\ 100 \quad (20 \times 5) \\ 800 \quad (20 \times 40) \\ \hline 1215 \\ 11 \end{array}$$

$$\begin{array}{r} 45 \\ \times 27 \\ \hline 315 \\ \underline{900} \\ 1215 \\ 11 \end{array}$$

Any questions please see your child's maths teacher.

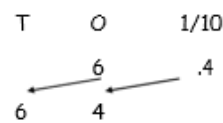
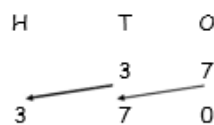
## Top tips for multiplication

- Multiplication should be taught alongside division as the inverse.
- Children should use the correct vocabulary.
- Multiplication can be done in any order.
- Check multiplication with division. This is called using the inverse operation.

E.g.  $5 \times 3 = 15$        $3 \times 5 = 15$

Check using the inverse:  $15 \div 3 = 5$        $15 \div 5 = 3$

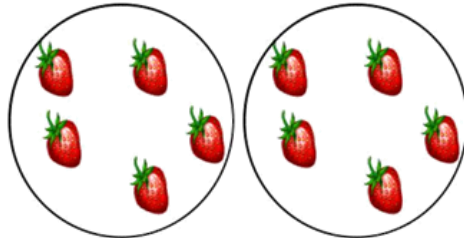
- Know times tables up to  $12 \times 12$  confidently (see back page).
- Always talk about the numbers (digits) moving to the left when multiplying.  
e.g. move all the numbers (digits) 1 place to the left and if there are no ones (units), 0 is the placeholder



# Steps in Division

Lots of practical and verbal division games and activities e.g. halving, sharing

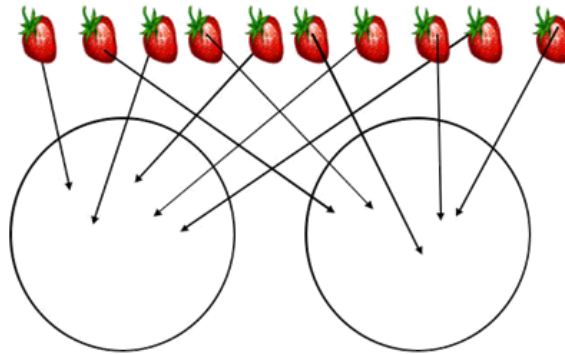
## Grouping



$$10 \div 2 = 5$$

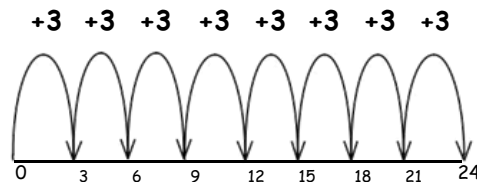
## Sharing

The arrows show what the children do and might not be drawn.



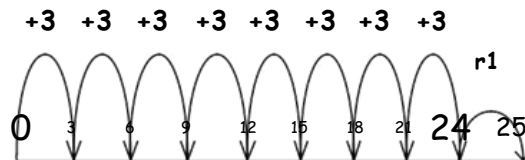
## Count On

(without remainders)



$$24 \div 3 = 8$$

(with remainders)

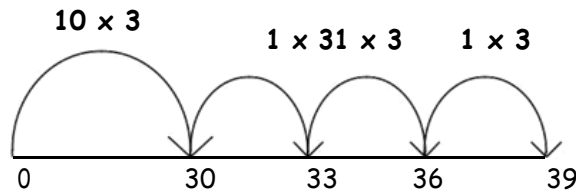


$$25 \div 3 = 8r1$$

# Steps in Division

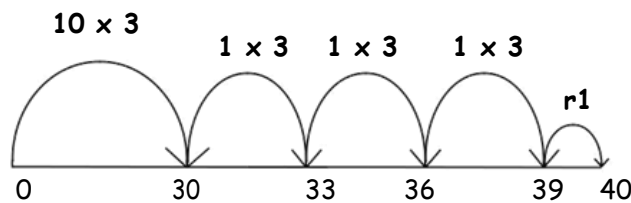
Count on in multiple chunks

(without remainders)



$$39 \div 3 = 13$$

(with remainders)



$$40 \div 3 = 13r1$$

Short division

(without remainders)

$$\begin{array}{r} 15 \\ 5 \overline{) 75} \end{array}$$

(with remainders)

$$\begin{array}{r} 14 \text{ r } 2 \\ 5 \overline{) 72} \end{array} \quad 14 \text{ r } 2 \text{ or } 14 \frac{2}{5} \text{ or } 14.4$$

Chunking method

$$432 \div 15 = 28 \text{ r } 12 \quad \text{or } 28 \frac{12}{15} \text{ or } 28 \frac{4}{5} \text{ or } 28.8$$

28 r 12	
15	As you are dividing by 15, take away multiples of 15
- 150	e.g.
-----	10 lots of 15 = 150
282	10 lots of 15 = 150
- 150	8 lots of 15 = 120
-----	remainder
132	
- 120	
-----	
12	

So, in total, there are 28 lots of 15, with a remainder of 12.

# Steps in Division

## Long division

Subtracting from target

$$432 / 15$$

$$\begin{array}{r}
 15 \overline{) 432} \\
 \underline{-300} \quad 20 \times \\
 132 \\
 \underline{-75} \quad 5 \times \\
 57 \\
 \underline{-30} \quad 2 \times \\
 27 \\
 \underline{-15} \quad 1 \times \\
 12
 \end{array}$$

= 28 r 12

Adding towards target

$$432 / 15$$

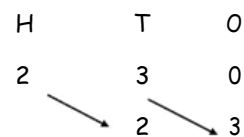
$$\begin{array}{r}
 15 \overline{) 432} \\
 300 \quad 20 \times \\
 \underline{+ 75} \quad 5 \times \\
 375 \\
 \underline{+ 30} \quad 2 \times \\
 405 \\
 \underline{+ 15} \quad 1 \times \\
 420
 \end{array}$$

= 28 r 12

432 - 420 = 12 remainder

## Top tips for division

- Division should be taught alongside multiplication as the inverse.
- Children should use the correct vocabulary.
- Check division with multiplication. This is called using the inverse operation.  
E.g.  $24 \div 6 = 4$        $24 \div 4 = 6$   
Check using the inverse:  $4 \times 6 = 24$        $6 \times 4 = 24$
- Always talk about the numbers (digits) moving to the right when dividing.  
E.g. move all the digits to the right and put in a decimal point after the ones (units)



## Times Tables

Current expectations for learning times tables are:

By the end of Year 2 = 2, 5 and 10 times table

By the end of Year 3 = 2, 3, 4, 5, 8 and 10 times table

By the end of Year 4 = all tables up to 12 x 12

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

To use this table to work out  $7 \times 9$ , find 7 on one side of the grid and 9 on the other.

Follow the lines until they meet.

$$7 \times 9 = 63$$

$$9 \times 7 = 63$$

Therefore, using the inverse, I also know

$$63 \div 9 = 7$$

$$63 \div 7 = 9$$