

St. Andrew's C. P. School



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Progression in Calculation

Part 2: Multiplication and Division

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Introduction

This booklet covers the methods your child is taught with regards to multiplication and division. We hope you find this useful when supporting your child with Maths at home.

Each section shows the progression of the methods used from Foundation Stage to Year 6. The sections build gradually from introducing multiplication and division to formal written methods. They are not split into year group or age related expectations as all children progress at different speeds.

Contents

Progression in Multiplication

Progression in Division

Progression in Multiplication

Times Tables

- First children count in steps forwards then backwards.

E.g. 2, 4, 6, 8, 10 etc.

- Then the children learn to recall the facts in order then, when secure at random.

E.g. $4 \times 2 = 8$ etc.

Start with 2s, 5s and 10s. Then 3s, 4s, 9s, 6s, 8s, 7s, 11s and 12s, in that order.

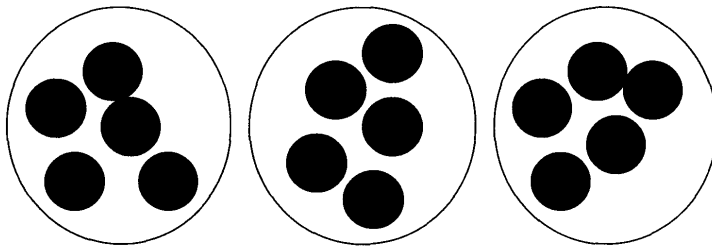
Up to $10 \times$ and then $12 \times$.

Use of songs/chanting.

Multiplication

- Children use practical resources, pictures and drawings. Putting objects into sets and counting the given number of sets

E.g. 3 groups of 5 are equal to 15, 3 fives are 15



5

10

15

- Also the use of the 100-square to circle steps and identify patterns.

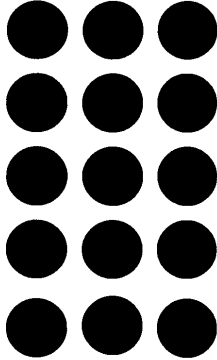
Multiplication as repeated addition

- 4 lots of 2
- $2 + 2 + 2 + 2 = 8$
- Then record using multiplication sign e.g. $4 \times 2 = 8$

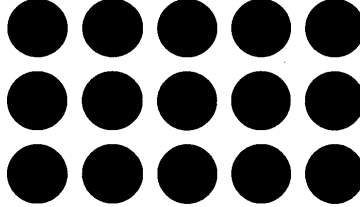
Multiplication Arrays

- Children use practical resources and pictures.

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



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



- Division is taught alongside multiplication to demonstrate that it is the inverse of multiplication.

E.g. How many groups of 5 make 15?

How many groups of 3 make 15?

Grid Method of Multiplication

- A number multiplied by a 1-digit number.

E.g. 24×3

x	20	4
3	60	12

Add the answers.

$$\begin{array}{r} 60 \\ + 12 \\ \hline 72 \end{array}$$

E.g. 156×4

x	100	50	6
4	400	200	24

Add the answers.

$$\begin{array}{r} 400 \\ 200 \\ + 24 \\ \hline 624 \end{array}$$

- A number multiplied by more than a 1-digit number.

E.g. $56 \times 27 = 1512$

x	50	6
20	1000	120
7	350	42

Add the answers.

$$\begin{array}{r} 1000 \\ 350 \\ 120 \\ + 42 \\ \hline 1512 \end{array}$$

Expanded Column Multiplication

- A number multiplied by a 1-digit number.

E.g. $3 \times 24 = 72$

$$\begin{array}{r} 24 \\ \times 3 \\ \hline 12 \text{ multiply the units } (3 \times 4) \\ 60 \text{ multiply the tens } (3 \times 20) \\ \hline 72 \text{ add the answers} \end{array}$$

E.g. $4 \times 156 = 624$

$$\begin{array}{r} 156 \\ \times 4 \\ \hline 24 \text{ multiply the units } (4 \times 6) \\ 200 \text{ multiply the tens } (4 \times 50) \\ 400 \text{ multiply the hundreds } (4 \times 100) \\ \hline 624 \text{ add the answers} \end{array}$$

Expanded Column Multiplication

- A number multiplied by more than a 1-digit number.

E.g. $27 \times 56 = 1512$

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 42 \text{ } (7 \times 6) \\ 350 \text{ } (7 \times 50) \\ 120 \text{ } (20 \times 6) \\ 1000 \text{ } (20 \times 50) \\ \hline 1512 \text{ add the answers} \end{array}$$

Compact Column Multiplication

- A number multiplied by a 1-digit number.

E.g. $3 \times 24 = 72$

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

E.g. $4 \times 156 = 624$

$$\begin{array}{r} 156 \\ \times 4 \\ \hline 624 \end{array}$$

Compact Vertical Multiplication

- A number multiplied by more than a 1-digit number.

E.g. $27 \times 56 = 1512$

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 3392 \quad \text{multiply by the units (7 \times 56)} \\ 1120 \quad \text{multiply by the tens (20 \times 56)} \\ \hline 1512 \quad \text{add the answers} \end{array}$$

Zero in the units column,
for place value, when
multiplying by the ten.

E.g. $24 \times 234 = 5616$

$$\begin{array}{r} 234 \\ \times 24 \\ \hline 936 \quad \text{multiply by the units (4 \times 234)} \\ 4680 \quad \text{multiply by the tens (20 \times 234)} \\ \hline 5616 \quad \text{add the answers} \end{array}$$

E.g. $234 \times 124 = 29,016$

	2	3	4	
x	1	2	4	
<hr/>				
	'9	'3	6	multiply by the units (4 x 234)
	4	6	8	0 multiply by the tens (20 x 234)
2	3	4	0	0 multiply by the hundreds (100 x 234)
<hr/>				
2	9	0	1	6 add the answers

Zero in the tens and units columns, for place value, when multiplying by the hundred.

Progression in Multiplication Vocabulary

- lots of, groups of
- once, twice, three times ...
- pair
- double
- times, multiply, multiplication, multiplied by
- four times, five times, ten times ...
- times - table
- row, column
- multiple of
- product
- factor
- brackets
- lowest common multiple
- prime factor

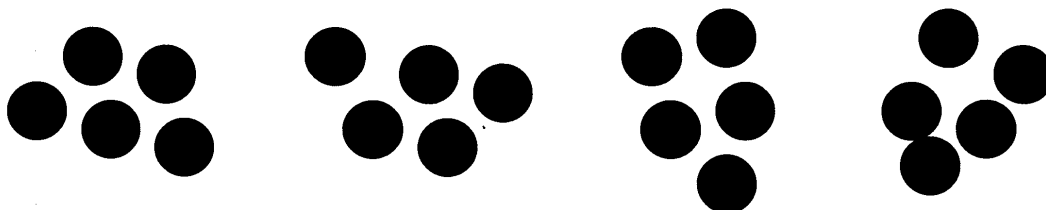
Progression in Division

Division as sharing

- Children begin by sharing objects practically and then pictorially.

E.g. $20 \div 4 = 5$

Children give one to each of 4 groups and continue until the groups are equal and there are none remaining. Then count how many are in each of the 4 groups.

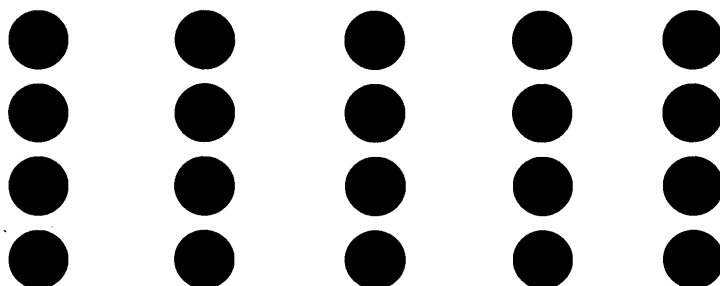


Division as grouping

- Children begin by grouping objects practically, then pictorially and finally counting in lots of.

E.g. $20 \div 4 = 5$

Put 4 into a group. Continue making groups of 4. Count how many groups of 4 have been made.



- Use of a 100-square.

E.g. $20 \div 4 = 5$

Count in 4s until you get to 20 then count how many groups of 4 there are have.

- Children should move on to counting in groups of 4 without needing to do this practically or using the number square but only when they feel confident enough.

E.g. $20 \div 4 = 5$

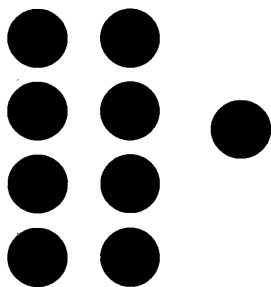
4, 8, 12, 16, 20 = 5 groups

Division as sharing and grouping with remainders.

- Children again begin by using objects and seeing how many do not fit into the equal groups that are created.

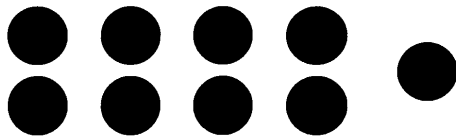
E.g. $9 \div 2 = 4 \text{ r } 1$

Sharing



$9 \div 2 =$
4 in each group with 1 remaining =
4 r 1

Grouping



$9 \div 2 =$
4 groups with one remaining =
4 r 1

- Children move on to counting in lots of and finding the remainder, without doing this practically.

E.g. $9 \div 2 = 4 \text{ r } 1$

2, 4, 6, 8 = 4 lots of 2

1 to make 9 = remainder 1

4 r 1

Use of Times Tables

- Children should use their knowledge of times tables to work out related division facts.

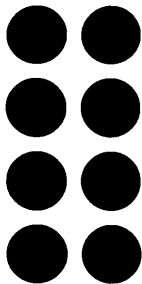
Use of number stories.

E.g. Three numbers 2, 4, and 8 will give 4 stories:

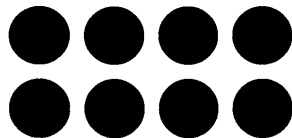
$$2 \times 4 = 8 \quad 4 \times 2 = 8 \quad 8 \div 2 = 4 \quad 8 \div 4 = 2$$

- To start with children can use arrays to support their working.

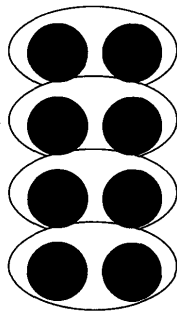
E.g. $4 \times 2 = 8$



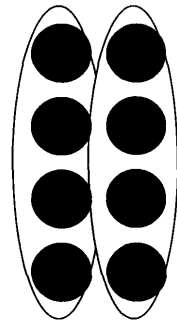
E.g. $2 \times 4 = 8$



E.g. $8 \div 2 = 4$



E.g. $8 \div 4 = 2$



- Children will see the patterns that develop and move onto doing this without support.

Long Division (repeated subtraction/chunking)

- If the divisor is a 1-digit number follow this method:

E.g. $217 \div 6 =$

Children keep subtracting 6s until the remainder is less than 6. The answer is the number of 6s that have been subtracted and the remainder.

$$\begin{array}{r}
 6 \overline{) 217} \\
 \underline{- 6} \\
 21 \\
 \underline{- 18} \\
 37 \\
 \underline{- 36} \\
 1
 \end{array}$$

Etc...

- It is easier to subtract multiples of 6 such as 60, (10, 100, and 1000 times the divisor are easy multiples to find).

E.g. $217 \div 6 = 36 \text{ r } 1$

$$\begin{array}{r}
 36 \text{ r } 1 \\
 6 \overline{) 217} \\
 \underline{- 60} \quad (10 \times 6) \\
 157 \\
 \underline{- 60} \quad (10 \times 6) \\
 97 \\
 \underline{- 60} \quad (10 \times 6) \\
 37 \\
 \underline{- 36} \quad (6 \times 6) \\
 1
 \end{array}$$

$$\begin{array}{r}
 36 \text{ r } 1 \\
 6 \overline{) 217} \\
 \underline{- 180} \quad (30 \times 6) \\
 37 \\
 \underline{- 36} \quad (6 \times 6) \\
 1
 \end{array}$$

$$30 + 6 = 36 \text{ r } 1$$

$$10 + 10 + 10 + 6 = 36 \text{ r } 1$$

- This process is gradually refined as children's estimating skills and speed at recalling tables improves.

Short Division

Short Division with no remainders

- Short division if the divisor is a 1-digit number.

E.g. $60 \div 5 = 12$

$$\begin{array}{r} 12 \\ 5 \overline{) 60} \end{array}$$

E.g. $468 \div 4 = 117$

$$\begin{array}{r} 117 \\ 4 \overline{) 468} \end{array}$$

Short Division with remainders

- Short division if the divisor is 1-digit with remainders.

E.g. $61 \div 5 = 12 \text{ r } 1$

$$\begin{array}{r} 12 \text{ r } 1 \\ 5 \overline{) 61} \end{array}$$

E.g. $419 \div 4 = 104 \text{ r } 3$

$$\begin{array}{r} 104 \text{ r } 3 \\ 4 \overline{) 419} \end{array}$$

Short Division with decimals

E.g. $104.75 \div 4 =$

$$\begin{array}{r} 104.75 \\ 4 \overline{) 419.30} \end{array}$$

Progression in Division Vocabulary

share

equally

each

left, left over

halve

one each, two each three each ...

group

group in pairs, ... threes, ... tens...

equal groups of

divide, division, divided by

remainder

divided into

divisible by

divisor

inverse

quotient

brackets