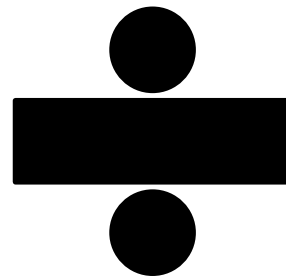
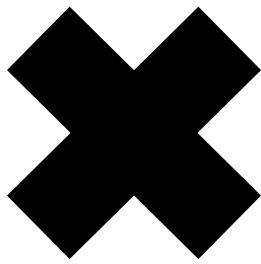




Progression in Calculation

Multiplication and Division



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.

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Progression in Multiplication

Times Tables

- first children count in steps forwards and then backwards

For example 2,4,6,8,10

- then children learn to recall the facts in order and when secure at random

For example $4 \times 2 = 8$

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

Up to 10x and then 12x

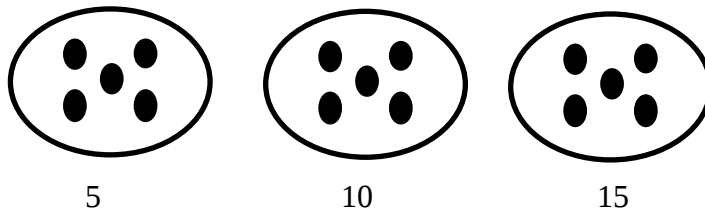
- use of songs/chanting

Multiplication

- children use practical resources, pictures and drawings, put objects into sets and count the given number of sets

For example

3 groups of 5 are equal to 15, 3 fives are 15



- use a 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

For example

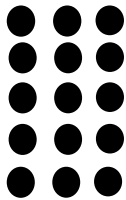
$$4 \times 2 = 8$$

Multiplication Arrays

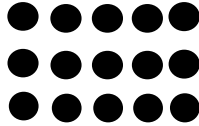
- children use practical resources and pictures

For example

$5 \times 3 = 15$



$3 \times 5 = 15$



- division is taught alongside multiplication to demonstrate that it is the inverse (opposite) of multiplication

For example

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

For example

24×3

X	20	4
3	60	12

Add the answers

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

For example

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

For example 56×27

X	50	6
20	1000	120
7	350	42

Add the answers

$$\begin{array}{r}
 1\ 0\ 0\ 0 \\
 3\ 5\ 0 \\
 1\ 2\ 0 \\
 +\ 4\ 2 \\
 \hline
 1\ 5\ 1\ 2
 \end{array}$$

- a number multiplied by a 1 digit number

For example

$$3 \times 24$$

$$4 \times 156$$

$$\begin{array}{r}
 2\ 4 \\
 \times\ 3 \\
 \hline
 7\ 2
 \end{array}$$

$$\begin{array}{r}
 1\ 5\ 6 \\
 \times\ 4 \\
 \hline
 6\ 2\ 4
 \end{array}$$

- A number multiplied by more than a 1 digit number

For example 27×56

$$\begin{array}{r}
 5\ 6 \\
 \times\ 2\ 7 \\
 \hline
 3\ 9\ 2 \\
 1\ 1\ 2\ 0 \\
 \hline
 1\ 5\ 1\ 2
 \end{array}$$

multiply by the units (7×56)

multiply by the tens (20×56)

add the answers

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

For example 24×234

$$\begin{array}{r}
 2\ 3\ 4 \\
 \times\ 2\ 4 \\
 \hline
 9\ 3\ 6 \\
 +\ 4\ 6\ 8\ 0 \\
 \hline
 5\ 6\ 1\ 6
 \end{array}$$

multiply by the units (4×234)

multiply by the tens (20×234)

add the answers

For example 234×124

$$\begin{array}{r} 234 \\ \times 124 \\ \hline 936 \\ 4680 \\ + 23400 \\ \hline 29016 \end{array}$$

multiply by the units (4×234)
multiply by the tens (20×234)
multiply by the hundreds (100×234)
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

Column multiplication with decimals

- two decimal numbers multiplied together each with 1 decimal place (one number after the decimal point)

For example 5.6×2.7

Begin by multiplying each number so they are whole numbers

$$5.6 \times 10 = 56$$

$$2.7 \times 10 = 27$$

Overall, the question has been multiplied by 100 (two lots of $\times 10$)

The calculation then becomes $56 \times 27 =$

Therefore $56 \times 27 = 1512$

Then, as the question was multiplied by 100 altogether (two lots of $\times 10$), the answer needs to be divided by 100 to finish the calculation

$1512 \div 100 = 15.12$

- Two decimal numbers multiplied together with a different number of decimal places

For example 2.34×2.4

Begin by multiplying each number so they are whole numbers

$2.34 \times 100 = 234$

$2.4 \times 10 = 24$

Overall, the question has been multiplied by 1000 (100×10)

The calculation then becomes $234 \times 24 =$

(calculate as column multiplication suggests)

Therefore $234 \times 24 = 5616$

Then, as the question was multiplied by 1000 altogether (100×10), the answer needs to be divided by 1000 to finish the calculation

$5616 \div 1000 = 5.616$

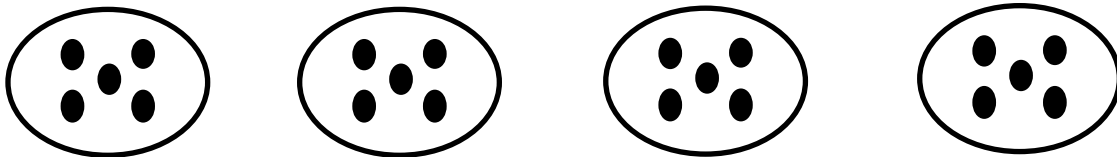
Progression in division

Division as sharing

- Children begin by sharing objects practically and then pictorially

For example $20 \div 4 = 5$

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.

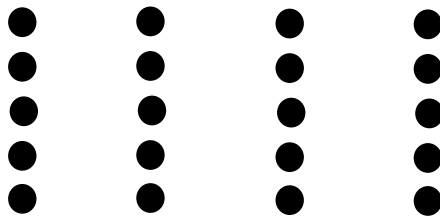


Division as grouping

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

For example $20 \div 4 = 5$

Put into a group. Continue making groups of 5. Count how many groups of 5 have been made



- Use of a 100 square

For example $20 \div 4 = 5$

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

- 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

For example $20 \div 4 = 5$

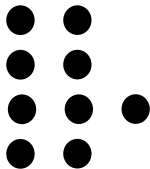
4, 8, 12, 16, 20 = 5 groups

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

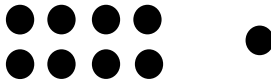
For example $9 \div 2 = 4 \text{ r } 1$

Sharing



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

Grouping



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

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

For example $9 \div 2 = 4 \text{ r } 1$

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 own knowledge of times tables to work out related division facts

Use of number stories

For example three numbers 2, 4 and 8 will give 4 stories

$$2 \times 4 = 8$$

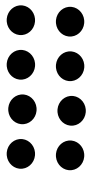
$$4 \times 2 = 8$$

$$8 \div 2 = 4$$

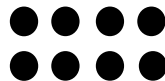
$$8 \div 4 = 2$$

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

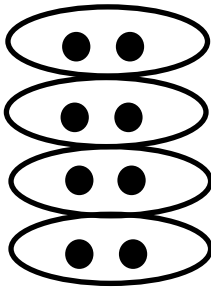
For example $4 \times 2 = 8$



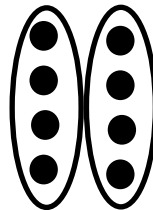
$2 \times 4 = 8$



$$8 \div 2 = 4$$



$$8 \div 4 = 2$$



- Children will see the patterns that develop and move on to doing this without support

Short division

Short division with no remainders

- Short division if the divisor is a 1 digit number

For example

$$60 \div 5 = 12$$

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

For example

$$468 \div 4 = 117$$

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

Short division with remainders

- Short division if the divisor is a 1 digit number with remainders

For example $61 \div 5 = 12 \text{ r } 1$

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

For example $419 \div 4 = 104 \text{ r } 3$

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

- Short division with decimals

For example $104.72 \div 4 =$

$$\begin{array}{r} 26.18 \\ 4 \overline{) 104.72} \end{array}$$

- Short division – changing the remainder into a decimal

For example $419 \div 4 =$

$$\begin{array}{r} 104.75 \\ 4 \overline{) 419.00} \end{array}$$

Long Division (repeated subtraction / chunking)

- If the divisor is a 2 digit number or greater. No remainders
For example $1472 \div 23 = 64$

$$\begin{array}{r}
 23 \overline{) 1472} \\
 \underline{- 920} \quad (40 \times 23) \\
 552 \\
 \underline{- 460} \quad (20 \times 23) \\
 92 \\
 \underline{- 92} \quad (4 \times 23) \\
 0
 \end{array}$$

- The divisor is a 2 digit number or greater. With remainders
For example $1472 \div 22 = 66 \text{ r } 20$

$$\begin{array}{r}
 22 \overline{) 1472} \\
 \underline{- 880} \quad (40 \times 22) \\
 592 \\
 \underline{- 440} \quad (20 \times 22) \\
 152 \\
 \underline{- 132} \quad (6 \times 22) \\
 20
 \end{array}$$

Long division

- This is the traditional way of doing long division.

For example $8,640 \div 15$

$$\begin{array}{r}
 15 \overline{) 8640}
 \end{array}$$

15 into 8 doesn't go, so look at the next digit

$$\begin{array}{r}
 5 \\
 15 \overline{) 8640} \\
 \underline{- 75} \\
 11
 \end{array}$$

15 goes into 86 five times, so put a 5 above the 6
 $15 \times 5 = 75$

Take that 75 away from the 86 to get your remainder
 $86 - 75 = 11$

$$\begin{array}{r}
 57 \\
 15 \overline{) 8640} \\
 \underline{- 75} \quad \downarrow \\
 114 \\
 \underline{- 105} \\
 9
 \end{array}$$

Next, carry the 4 down to make 114

15 goes into 114 seven times, so put a 7 above the 4

$$15 \times 7 = 105$$

Take 105 from the 114 to get your remainder

$$114 - 105 = 9$$

$$\begin{array}{r}
 576 \\
 15 \overline{) 8640} \\
 \underline{- 75} \quad \downarrow \\
 114 \quad \downarrow \\
 \underline{- 105} \\
 90
 \end{array}$$

Carry the 0 down to make 90

15 goes into 90 exactly 6 times, so put a 6 above the 0

$$15 \times 6 = 90$$

$$8,640 \div 15 = 576$$

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