

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

Methods:

### Early Learning Goal:

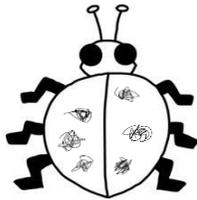
**Children solve problems, including halving and sharing.**

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, including small world play, role play, counters, cubes etc.

Children may also investigate sharing items or putting items into groups using items such as egg boxes, ice cube trays and baking tins which are arrays.



They may develop ways of recording calculations using pictures, etc.



A child's jotting showing halving six spots between two sides of a ladybird.



child's jotting showing how they shared the apples at snack time between two groups.



## Reception

Key Vocabulary:

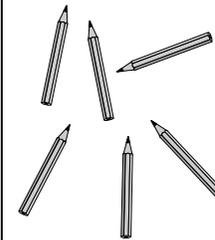
Twenty...nineteen...eighteen ...to zero, hundred...ninety...eighty...to zero count, count back (from, to) count in ones, twos... tens..., how many times? Even, pair, pattern, estimate ,halve, sort, equal, sets of, share, each

### Ideas for assessment questions:

Share the biscuits out so that everyone has the same number.

-----  
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Share these pencils equally between Asif and Ben. How many pencils will each of them get.



Share the teacups so that each teddy bear gets one teacup. We have 11 cakes. Each teddy bear needs two cakes, will there be any cakes left over?

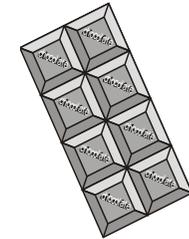
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How many children can have 2 coins from this pile of ten 10p coins?

Share the cards between the players so that each player gets 5 cards.

Share these coins between three children so that each child gets the same number of coins.

How many children can have two squares each of this chocolate?



Put half of these ten animals in the ark. How many of the animals are in the ark?

-----  
How many towers of 5 cubes can we make from this bucket of cubes? Count the groups of cubes.

-----  
How many pairs of socks can we make from this pile of socks? Count the pairs.

-----  
Share the stickers between 3 children equally. How many stickers does each child get? Are there any stickers left over?

-----  
Can you cut the cake in half? How many pieces are there?

Useful Links:

<http://www.tentown.co.uk/>

Common Misconceptions:

- Makes unequal groups and is unable to compare the groups.
- When sharing, can sometimes make equal groups, but has no strategies to deal with any left over.
- When halving, makes two unequal groups or splits a single object unequally.

Problem Solving Links/Ideas:

<http://www.mathswarriors.co.uk/inv.html>

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

## Year 1

Methods:

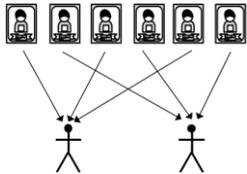
Key Vocabulary:

### End of Year Objective:

**Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.**

problem, solution, calculate, calculation, number sentence, answer, method, explain, money, coin, pence, penny, pound, pay, change, buy, sell, price, spend  
 number sequences, count back (from, to) in ones, twos...fives..... tens...less, few, many, odd, even, how many times? pair, multiple, half, halves

In year one, children will continue to solve division problems using practical equipment and jottings. They should use the equipment to share objects and separate them into groups, answering questions such as 'If we share these six apples between the three of you, how many will you each have? How do you know?' or 'If six football stickers are shared between two people, how many do they each get?' They may solve both of these types of question by using a 'one for you, one for me' strategy until all of the objects have been given out.



Children should be introduced to the concept of simple remainders in their calculations at this practical stage, being able to identify that the groups are not equal and should refer to the remainder as '... left over'.

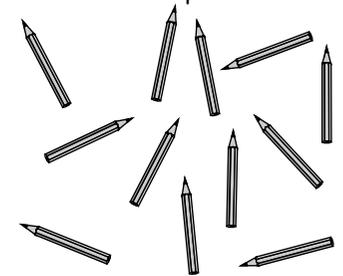
### Ideas for assessment questions:

There are twenty children in a classroom.  
 Half of them are girls.

How many are boys?

Level 2b [oral]

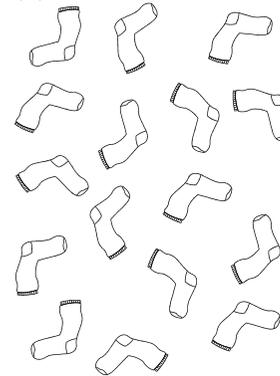
Here is a set of 12 pencils.



How many is half the set?

Level 2c

How many pairs of socks are there?

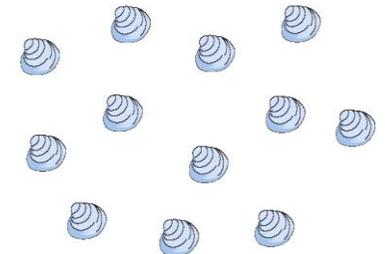


Level 2b

How many wheels do we need to make three cars?

We need to put 12 cakes into boxes of 3.  
 How many boxes will we have? What if we had to put the same number of cakes into boxes of 4?

Four children share these shells.  
 They each get the same number of shells.



How many shells does each child get?

Level 2c

Useful Links:

Common Misconceptions:

For common misconceptions in Year 1 please see Reception or Year 2

Problem Solving Links/Ideas:

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

## Year 2

Methods:

Key Vocabulary:

**End of Year Objective:**  
**Calculate mathematical statements for division within the multiplication tables and write them using the division ( $\div$ ) and equals (=) signs.**

*calculate, calculation, inverse, answer, explain, method, sign, operation, symbol, number sentence, number line, mental calculation, written calculation, informal method, jottings, diagrams, pictures, images*  
 grouping, halve, share, share equally, one each, two each, three each...  
 group in pairs, threes... tens, equal groups of,  $\div$  sign, divide, divided by, divided into, left, left over, remainders

Children will utilise practical equipment to represent division calculations as grouping (repeated subtraction) and use jottings to support their calculation, e.g.



Children need to understand that this calculation reads as 'How many groups of 3 are there in 12?'

They should also continue to develop their knowledge of division with remainders, e.g.



$13 \div 4 = 3$  remainder 1

Children need to be able to make decisions about what to do with remainders after division and round up or down accordingly. In the calculation  $13 \div 4$ , the answer is 3 remainder 1, but whether the answer should be rounded up to 4 or rounded down to 3 depends on the context, as in the examples below:

I have £13. Books are £4 each. How many can I buy? Answer: 3 (the remaining £1 is not enough to buy another book)

Apples are packed into boxes of 4. There are 13 apples. How many boxes are needed? Answer: 4 (the remaining 1 apple still needs to be placed into a box).

### Ideas for assessment questions:

There are 35 children. They get into teams of 5. How many teams are there altogether?  
 Level 3

What is half of this amount?

-----

Level 3

Luke worked out the correct answer to  $40 \div 5$ . His answer was 8 Show how he could have worked out his answer.  
 Level 3

Mary eats half of these cherries.

-----

How many does she eat?  
 Level 2b

Harry has a set of 22 pencils. How many is half the set?  
 Level 2c

Write the answer.  
 $45 \div 5 = \square$   
 Level 3

At the shop, all packets of crisps cost the same. Hannah buys 2 packets. She pays 40 pence. How much does one packet cost?  
 Level 2c [oral]

-----

Write the missing number in the box.  
 $\square \div 2 = 7$   
 Level 3

John puts these apples in bags.

23 children are coming to John's party. Each child will get 1 ice cream. There are 10 ice creams in a box. How many boxes does John need to buy?  
 Level 2a

He puts 5 apples in each bag. How many apples will be left over?  
 Level 2b

-----

There are 20 eggs. A box holds 6 eggs. How many boxes are needed to hold all the eggs?  
 Level 2a

### Useful Links:

### Common Misconceptions:

- Does not use knowledge of doubles to find half of a number; for example, continues to find half by sharing using a 'one for you' approach and cannot apply knowledge of doubles.

### Problem Solving Links/Ideas:

- Is not systematic when sharing into equal groups, using a 'one for you' approach; does not use the language of division to describe the process.
- Does not understand that 'sets of' or 'groups of' need to be subtracted to solve the problem.

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

## Year 3

Methods:

Key Vocabulary:

### End of Year Objective:

Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, progressing to formal written methods.\*

\*Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4  
It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

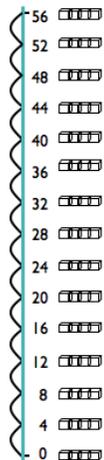
In preparation for developing the 'chunking' method of division, children should first use the repeated subtraction on a vertical number line alongside the continued use of practical equipment. There are two stages to this:

Stage 1 - repeatedly subtracting individual groups of the divisor

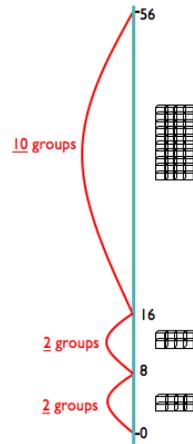
Stage 2 - subtracting multiples of the divisor (initially 10 groups and individual groups, then 10 groups and other multiples in line with tables knowledge)

After each group has been subtracted, children should consider how many are left to enable them to identify the amount remaining on the number line.

Stage 1  
 $56 \div 4 = 14$  (groups of 4)



Stage 2  
 $56 \div 4 = 10$ (groups of 4) +  $2$ (groups of 4) +  $2$ (groups of 4)  
 $= 14$ (groups of 4)



Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

problem, solution, calculate, calculation, inverse, answer, method, explain, predict, estimate, reason, operation, symbol, number sentence, equation, mental calculation, written calculation, informal method, jottings, number line, pound (£), penny/pence (p), note, coin, units of measurement and their abbreviations  
share, share equally, one each, two each, three each, group in pairs, threes... tens, equal groups of, ÷ sign, divide, division, divided by, divided into, left, left over, remainder, inverse

### Ideas for assessment questions:

Circle the three numbers which divide by 5 with no remainder.

84	85	86
91	92	93
98	99	100
105	106	107

Level 3

20 children sit at tables in groups of 4. How many groups will there be?

Level 2a [oral]

What is the remainder when twenty-seven is divided by five?

Mental test level 3

Circle the two divisions which have an answer of 5 remainder 2

$17 \div 5$       $17 \div 3$       $22 \div 4$       $22 \div 5$

Level 3

Ten children can sit at one table. There are 43 children.

How many tables are needed so that each child can sit at a table?

Level 3

Divide forty-two by six.  
Mental test level 4

Five is a quarter of a number. What is the number?

Level 3 [oral]

Write the missing number in the box.

$\square \div 2 = 7$

Level 3

There are 35 children. They get into teams of 5. How many teams are there altogether?

Level 3

Write the answer.

$45 \div 5 = \square$

Level 3

A carton of orange fills 6 cups.

Mrs Green wants to fill 50 cups with orange.

How many cartons of orange does she need to buy?

Level 3

Write a number in each box to make this correct.

$300 \div 2 = \square \times \square$

Level 3

		----- Lucy has 16 cards. She gives a quarter of her cards to Kieran. How many cards does Lucy give to Kieran? Level 3	
Useful Links:	Common Misconceptions:		
	For common misconceptions in Year 3 please see Year 2 or Year 4		
Problem Solving Links/Ideas:			

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

## Year 4

Methods:

Key Vocabulary:

**End of Year Objective:**

*Divide numbers up to 3 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.*

Children will continue to develop their use of grouping (repeated subtraction) to be able to subtract multiples of the divisor, moving on to the use of the 'chunking' method.

$$\begin{array}{r}
 14 \\
 4 \overline{) 56} \\
 \underline{-40} \quad 10x \\
 16 \\
 \underline{-16} \quad 4x \\
 0
 \end{array}$$

Answer: 14

Children should write their answer above the calculation to make it easy for them and the teacher to distinguish.

When developing their understanding of 'chunking', children should utilise a 'key facts' box, as shown below. This enables an efficient recall of tables facts and will help them in identifying the largest group they can subtract in one chunk. Any remainders should be shown as integers. By the end of year 4, children should be able to use the chunking method to divide a three digit number by a single digit number..g.

$73 \div 3$

$$\begin{array}{r}
 24r1 \\
 3 \overline{) 73} \\
 \underline{-30} \quad 10x \\
 43 \\
 \underline{-30} \quad 10x \\
 13 \\
 \underline{-6} \quad 2x \\
 7 \\
 \underline{-6} \quad 2x \\
 1
 \end{array}$$

W. I. K.

- $1 \times 3 = 3$
- $2 \times 3 = 6$
- $4 \times 3 = 12$
- $8 \times 3 = 24$
- $10 \times 3 = 30$
- $20 \times 3 = 60$
- $40 \times 3 = 120$

$196 \div 6$

$$\begin{array}{r}
 32r4 \\
 6 \overline{) 196} \\
 \underline{-120} \quad 20x \\
 76 \\
 \underline{-60} \quad 10x \\
 16 \\
 \underline{-12} \quad 2x \\
 4
 \end{array}$$

W. I. K.

- $1 \times 6 = 6$
- $2 \times 6 = 12$
- $4 \times 6 = 24$
- $8 \times 6 = 48$
- $10 \times 6 = 60$
- $20 \times 6 = 120$
- $40 \times 6 = 240$

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

Useful Links:

Common Misconceptions:

- Is muddled about the correspondence between multiplication and division facts, recording, for example,  $3 \times 5 = 15$  so  $5 \div 15 = 3$ .
- Assumes that commutative law holds for division also. For example, assuming that  $15 \div 3 = 5$  so  $3 \div 15 = 5$ .
- Writes a remainder that is larger than the divisor. For example,  $36 \div 7 = 4$  remainder 8.
- Discards the remainder, as does not understand its significance.
- Continues to subtract twos when calculating 20 divided by 2 without using knowledge that 2 multiplied by 5 equals ten.

Problem Solving Links/Ideas:

calculate, calculation, equation, operation, symbol, inverse, answer, method, explain, predict, reason, reasoning, pattern, relationship, decimal, decimal point, decimal place, pound (£), penny/pence (p), units of measurement and abbreviations, degrees Celsius

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

### Ideas for assessment questions:

Divide forty-eight by eight.

Mental test level 4

What is twenty-seven divided by nine?

Mental test level 4

Divide forty-two by six.

Mental test level 4

If one hundred and seventy children are put into groups of ten children, how many groups will there be?

Mental test level 3

Write in the missing number.  $\square \div 10 = 20$

Level 3

Write in the missing number.  $\square \div 5 = 22$

Level 4

Divide ninety by three.

Mental test level 3

Calculate  $56 \div 4$ . KS2 2005 Paper A level 3

What is the remainder when you divide 53 by 8?

Level 3

Nineteen marbles are shared between some children. Each child receives six marbles and there is one marble left over. How many children share the marbles?

Mental test level 3

Divide three hundred and ninety by ten.

Mental test level 4

Write the answer.  $84 \div 7 =$

Level 4

Circle each number which has a remainder of 2 when divided by 5.

27 15 26 45 32 24

Level 3

Parveen buys 3 small bags of peanuts. She gives the shopkeeper £2 and gets 80p change. What is the cost in pence of one bag of peanuts?

Level 4

Write in the missing numbers.

$4 \times \square = 200$

Level 3

What is the remainder when you divide 53 by 8?

Level 3

# FEATHERSTONE ACADEMY

## Progression through calculations for DIVISION

## Year 5

Methods:

Key Vocabulary:

**End of Year Objective:**

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

Children may continue to use the key facts box for as long as they find it useful. Using their knowledge of linked tables facts, children should be encouraged to use higher multiples of the divisor. Any remainders should be shown as integers. By the end of year 5, children should be able to use the chunking method to divide a four digit number by a single digit number. The key facts box can be extended to include 100x.

523 ÷ 8

$$\begin{array}{r} 65r3 \\ 8 \overline{) 523} \\ \underline{- 320} \phantom{00} \\ 203 \\ \underline{- 160} \phantom{00} \\ 43 \\ \underline{- 40} \\ 3 \end{array}$$

40x  
20x  
5x

W.I.K.

1 × 7 = 7  
2 × 7 = 14  
4 × 7 = 28  
8 × 7 = 56  
10 × 7 = 70  
20 × 7 = 140  
40 × 7 = 280  
80 × 7 = 560

2458 ÷ 7

$$\begin{array}{r} 351r1 \\ 7 \overline{) 2458} \\ \underline{- 2100} \phantom{00} \\ 358 \\ \underline{- 350} \phantom{00} \\ 8 \\ \underline{- 7} \\ 1 \end{array}$$

300x  
50x  
1x

W.I.K.

1 × 7 = 7  
2 × 7 = 14  
4 × 7 = 28  
8 × 7 = 56  
10 × 7 = 70  
20 × 7 = 140  
40 × 7 = 280  
100 × 7 = 700  
200 × 7 = 1400  
400 × 7 = 2800

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

calculate, calculation, equation, operation, symbol, inverse, answer, method, strategy, explain, predict, reason, reasoning, pattern, relationship, decimal, decimal point, decimal place, estimate, approximate, pound (£), penny/pence (p), units of measurement and abbreviations, degrees Celsius  
share, share equally, halve, one each, two each, three each... group in pairs, threes... tens, equal groups of, divide, divided by, divided into, divisible by, remainder, factor, quotient, divisible by, inverse

### Ideas for assessment questions:

What is the smallest number that leaves:  
a remainder of 1 when divided by 2;  
a remainder of 2 when divided by 3;  
a remainder of 3 when divided by 4;  
a remainder of 5 when divided by 6?

Divide thirty-one point five by ten.  
Level 5

Calculate  $942 \div 6$   
Level 4

How many nines are there in fifty-four?  
Mental test level 4

Write in the missing numbers.  
 $32.62 \div 10 =$   
Level 4

Divide ninety by three.  
Mental test level 3

How many sevens are there in two hundred and ten?  
Mental test level 4

Write what the four missing digits could be.  
 $\square\square\square \div 10 = 3\square$   
Level 4

Calculate  $847 \div 7$ .  
Level 4

Ten times a number is eighty-six. What is the number?  
Mental test level 5

What is the smallest whole number that is divisible by five and by three?  
Mental test level 4

Useful Links:

Common Misconceptions:

For common misconceptions in Year 5 please see Year 4 or Year 6.

Problem Solving Links/Ideas:

# FEATHERSTONE ACADEMY

## Progression through calculations for MULTIPLICATION

Year 6

Methods:

Key Vocabulary:

End of Year Objective:

Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

Use written division methods in cases where the answer has up to two decimal places.

calculate, calculation, equation, operation, symbol, inverse, answer, method, strategy, explain, predict, reason, reasoning, pattern, relationship, decimal, decimal point, decimal place, estimate, approximate, pound (£), penny/pence (p), units of measurement and abbreviations, degrees Celsius

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, integer

6367 ÷ 28

$$\begin{array}{r} 227r11 \\ 28 \overline{)6367} \\ \underline{-5600} \phantom{00} \\ 767 \phantom{00} \\ \underline{-560} \phantom{00} \\ 207 \phantom{00} \\ \underline{-140} \phantom{00} \\ 67 \phantom{00} \\ \underline{-56} \phantom{00} \\ 11 \end{array}$$

W.I.K.

1 × 28 = 28  
2 × 28 = 56  
4 × 28 = 112  
8 × 28 = 224  
10 × 28 = 280  
20 × 28 = 560  
40 × 28 = 1120  
80 × 28 = 2240  
100 × 28 = 2800  
200 × 28 = 5600  
400 × 28 = 11200

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

The remainder can also be shown as a fraction. So the remainder is given as the numerator and the divisor is given as the denominator. i.e.

13 divided by 4 = 3 r1 or  $3 \frac{1}{4}$

Fractions should also be shown in their lowest form.

So, if the fraction is  $\frac{6}{8}$  it can be reduced to  $\frac{3}{4}$

$$\begin{array}{r} 21.29 \\ 17 \overline{)362} \\ \underline{-340} \phantom{00} \\ 22 \phantom{00} \\ \underline{-17} \phantom{00} \\ 50 \phantom{00} \\ \underline{-34} \phantom{00} \\ 160 \phantom{00} \\ \underline{-153} \phantom{00} \\ 007 \end{array}$$

W.I.K.

1 × 17 = 17  
2 × 17 = 34  
4 × 17 = 68  
8 × 17 = 136  
10 × 17 = 170  
20 × 17 = 340  
-----  
0.1 × 17 = 1.7  
0.2 × 17 = 3.4  
0.01 × 17 = 0.17  
0.02 × 17 = 0.34  
0.04 × 17 = 0.68  
0.08 × 17 = 1.36

### Ideas for assessment questions:

Divide four point eight by eight.

Mental test level 4

Divide four point two by six.

Mental test level 4

Divide four point two by seven.

Mental test level 4

Write in the missing number.

$\square \div 5 = 22$

Level 4

Calculate  $123 \div 5$ . Calculate  $16.5 \div 3$

Calculate  $847 \div 7$ .

Level 4

Calculate  $942 \div 6$

Level 4

Write in the missing numbers.

$32.62 \div 10 =$

Level 4

Write in the missing digit.

$5 \square \times 8 = 456$

Level 4

Eggs are put in trays of 12.

The trays are packed in boxes.

Each box contains 180 eggs.

How many trays are in each box?

Level 4

Shenaz buys a pack of 24 cans of cola for £6.00



What is the cost of each can?

Level 5

Useful Links:

Common Misconceptions:

- Has difficulty interpreting, when appropriate, a remainder as a fraction, for example:  $16 \div 3 = 5 \frac{1}{3}$
- Interpreting division only as sharing and not grouping (repeated subtraction) so is unable to interpret calculations such as  $12 \div \frac{1}{2}$

Problem Solving Links/Ideas:	<ul style="list-style-type: none"><li>• Is not confident in making reasonable estimates for multiplication or division calculations.</li></ul>		

**PROGRESSION THROUGH CALCULATIONS FOR DIVISION**