Ash Croft Primary Academy

Calculation & Fluency Policy – Progression in Division

Last updated: 10th February 2022

This document outlines the progression in division strategies throughout our academies. Teaching staff should consider using previously taught written methods as part of visually representing mental methods later in a child's school journey. For example, using various grouping/sharing methods as a way to visually represent mental methods in Key Stage 2.

It has been carefully put together in line with the National Curriculum (2014), the Government's non-statutory guidance for teaching mathematics (June 2020) and our existing approach to teaching mathematics. This document has been organised respective of age-related expectations and learning should still be differentiated appropriately.

Progression in learnt multiplication facts
Written division strategies are learnt formally in Key Stage 2, with 'short division' first being taught in Year 5 and 'long division' being taught in Year 6. The Multiplication Tables Check (MTC) in Year 4 aims to ensure children are meeting the National Curriculum objective *"to recall multiplication and division facts for multiplication tables up to 12 × 12"*. Learning times tables by heart is fundamentally important to ensure children can access the full curriculum beyond Year 4. With this in mind, the diagram below shows our age-related expectations for learning times tables.

By the end of Year 2			By the end of Year 3			By the end of Year 4				
10x	**5x**	**2x**	**4x**	**8x**	**3x**	**6x**	**9x**	**7x**	**11x**	**12x**

Year 1

In Year 1, pupils should aim to become fluent in counting in multiples of 2, 5 and 10 as this will help them when dividing by these numbers (fluent children will progress to skip counting and solving problems independently, rather than relying on concrete or pictorial scaffolds).

The main focus in Year 1 should be on quotitive division methods ("grouping" problems as opposed to "sharing" problems). This is where the total quantity (dividend) and the group size (divisor) are known, so the number of groups (quotient) can be calculated by skip counting in the divisor.

	Quotitive division contexts	Partitive division contexts
Example problem	*'There are fifteen biscuits. If I put them into bags of five, how many bags will I need?'*	*'I have twenty conkers and I share them equally between five children. How many conkers does each child get?'*
Key language	***'…divided into groups of…'*** *e.g.* *'Fifteen divided into groups of five is equal to three.'*	***'…divided between…'*** *e.g.* *Twenty divided between five is equal to four each.'*

Children should become familiar with the division symbol (÷) in Year 1 as a way of presenting written calculations. This is to help build understanding of the symbol from a young age.

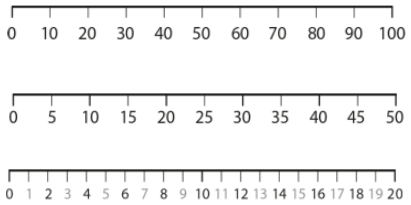
The children should only be learning about partitive division when calculating simple fractions of amounts.

Picture examples

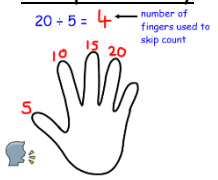
Lesson videos

Skip counting

Representations - using number lines or other pictorial methods to support



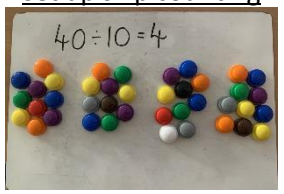
Using fingers to skip count independently



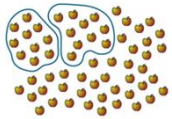
Real-life contexts and "natural" groups to practice further

Grouping problems

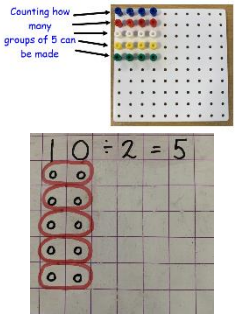
Concrete methods – making groups of the given divisor to set up skip counting



Children making their own groups from given images by drawing loops



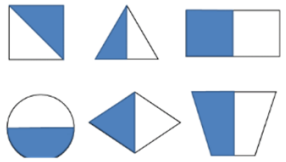
Children making their own groups using arrays

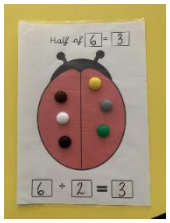


Fractions of amounts

Finding 1/2

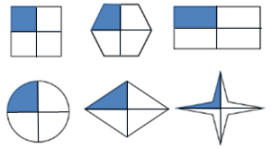
Shade a half of each of these shapes.

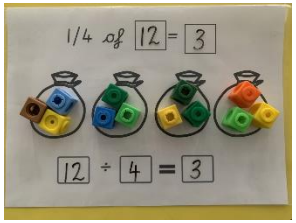




Finding 1/4

Shade a quarter of each of these shapes.





Year 2

In Year 2, pupils should first revisit and consolidate learning from Year 1, where they focused on quotitive division methods ("grouping" problems as opposed to "sharing" problems). These will be presented as division calculations for children to solve, just like in Year 1 (e.g. 20÷5=_).

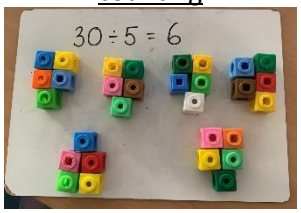
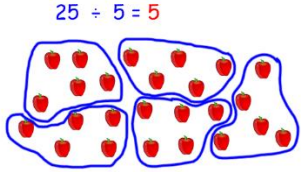
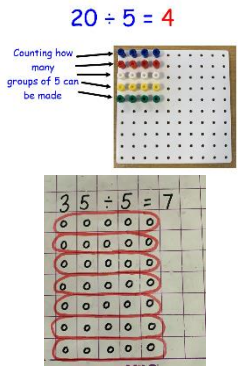
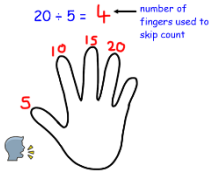
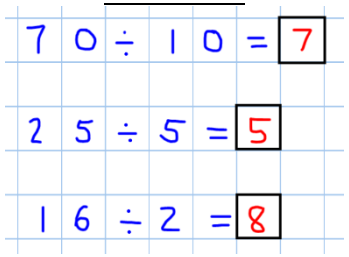
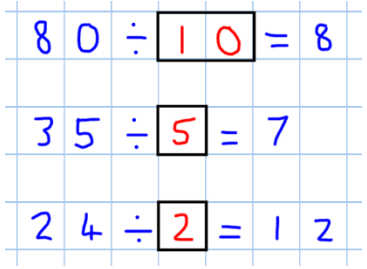
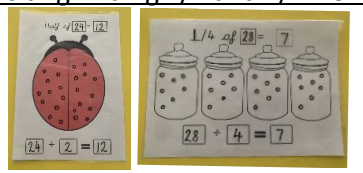
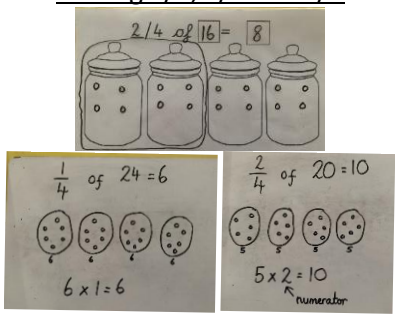
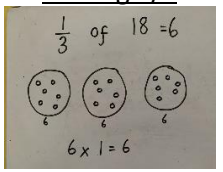
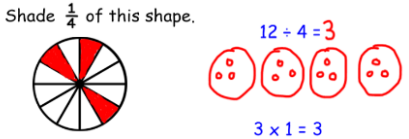
In order to solve quotitive division methods, children should use a range of concrete and pictorial methods to deepen their understanding of division by grouping. This will lead to them eventually using looped arrays to draw their own groups.

By the end of Year 2, pupils need to be able to solve division calculations that are not set in contexts. They should recognise that they need to skip count in the divisor (2, 5 or 10), or use the associated multiplication fact, to find the quotient. For example, to calculate 60÷10, they can skip count in tens (counting the required number of tens) or apply the fact that 6x10=60.

Children should not be relying on concrete or pictorial methods such as number lines, drawing dots or using arrays. They should all be independently skip counting by the end of Year 2.

Picture examples

Lesson videos

Grouping problems	*Calculatioms without context*	*Fractions of amounts*
Concrete methods – making groups of the given divisor to set up skip counting  Children making their own groups from given images by drawing loops  Children making their own groups using arrays 	Using fingers to skip count independently  Solving traditional division calculations  Solving missing divisor problems 	Revisiting finding 1/2 and 1/4 from Y1  Finding 1/4, 2/4 and 3/4  Finding 1/3  Finding a fraction of a shape 

Year 3

<u>In Year 3,</u> pupils should be able to recall multiplication facts, and corresponding division facts, for times tables learned in Year 2 (10, 5 and 2x tables). They should then progress to learning the 4, 8 and 3x tables during Year 3. Pupils should be fluent in the times table facts and corresponding division facts for the 4, 8 and 3x tables to prepare them for the expectations in Year 4 and the MTC (Multiplication Tables Check).

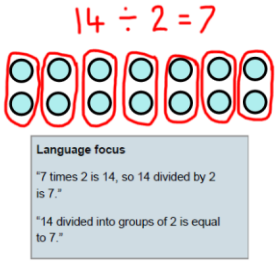
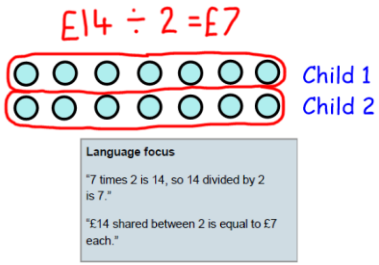
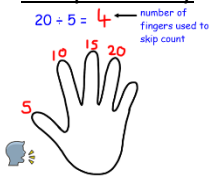
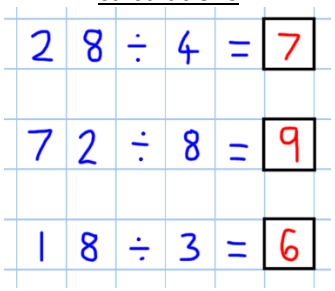
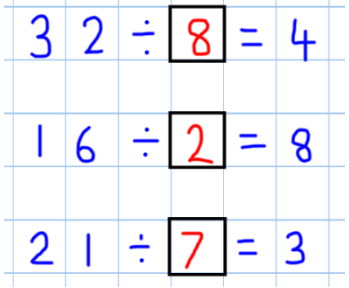
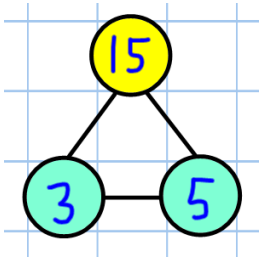
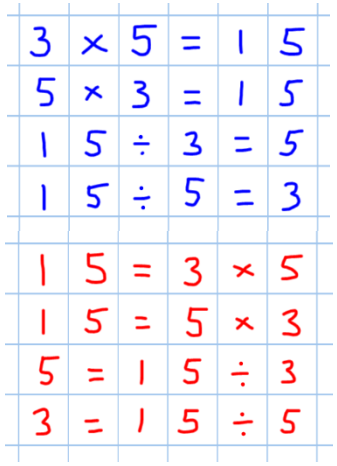
Our approach in Year 3 is to first revisit <u>quotitive division</u> methods ("grouping" problems). However, the children will also be introduced to <u>partitive division</u> methods ("sharing" problems). The example questions in the first column opposite show how contextualised problems can lead children to using both of these methods as appropriate to answer questions. This will begin to develop children's understanding of commutativity, which is built upon in the teaching of fact families and developed further in Year 4.

Understanding fact families is a key learning point so that children can make links between known times table facts and corresponding division facts without the use of concrete or pictorial methods.

Pupils should also be fluent in interpreting contextual multiplication and division problems, identifying the appropriate calculation and solving it using automatic recall of the relevant fact. As pupils become fluent with multiplication facts, they should develop fluency in related calculations by scaling facts by 10. For example, if 3x4=12, then 30x4=120. And, if 12÷3=4, then 120÷4=30.

Picture examples

Lesson videos

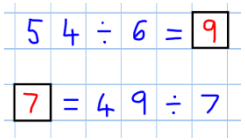
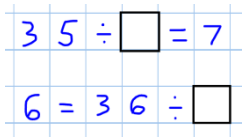
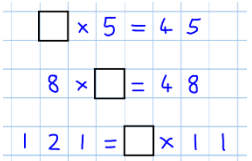
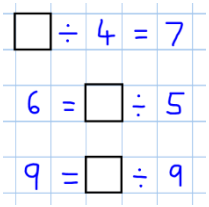
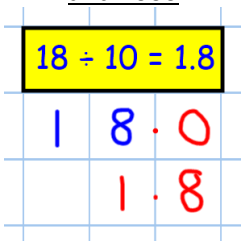
Grouping and sharing problems	*Calculations without context*	*Fact families*
<u>Quotitive Division</u> I need 14 ping-pong balls. There are 2 ping-pong balls in a pack. How many packs do I need?  <u>Partitive Division</u> £14 is shared between 2 children. How much money does each child get? 	<u>Using fingers to skip count independently</u>  <u>Solving traditional division calculations</u>  <u>Solving missing divisor problems</u> 	*It is important to note that there are 4 different number sentences that can be made as part of a fact family, but that these can be presented with the single-number answer either side of the equals sign. Children should be exposed to both formats to familiarse with the concept of 'balanced equations'.*  

Year 4

In Year 4, the main multiplication calculation focus should be the ability to recall all multiplication table facts. This is extended to being able to recall all related division facts up to 12x12. Lesson videos here refer to using skip counting methods to solve these problems, but children who are fluent with their multiplication and related division facts will be able to solve these types of problem by automatic recall of their known facts. Dividing by powers of 10 should be learned also.

Pupils should also be fluent in interpreting contextual multiplication and division problems, identifying the appropriate calculation and solving it using automatic recall of the relevant fact. As pupils become fluent with multiplication facts, they should develop fluency in related calculations by scaling facts by 100. For example, if 3x4=12, then 300x4=1,200. And, if 12÷3=4, then 1,200÷4=300.

Picture examples

Solving traditional division calculations	Solving missing divisor problems	Solving missing factor problems	Solving missing dividend problems	Dividing by 10, 100 and 1000
				

Lesson videos

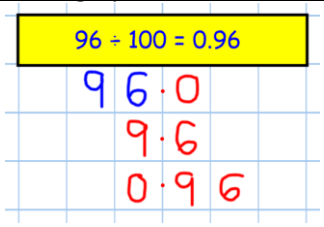
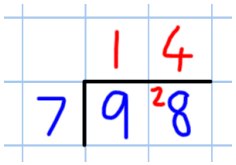
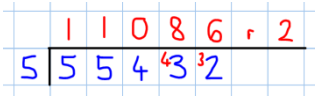
				

Year 5

In Year 5, pupils should be able to divide a number with up to 4 digits by a 1-digit number using the short division method. They should also be able to interpret remainders appropriately for the context, although they do not need to express remainders arising from short division using proper fractions or decimal fractions.

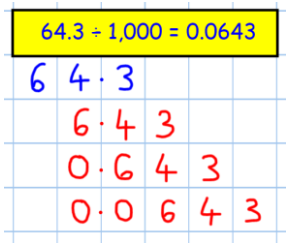
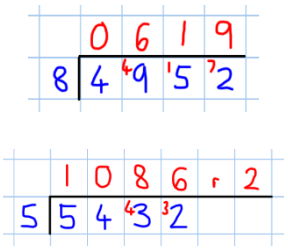
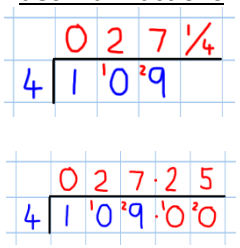
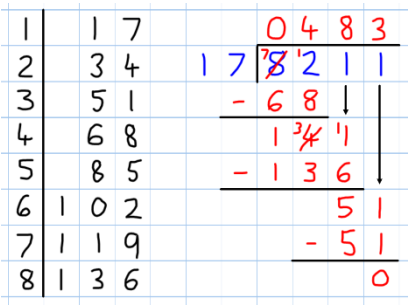
Pupils should be fluent in interpreting contextual problems to decide when division is the appropriate operation to use, including as part of multi-step problems. In addition, pupils should be able to interpret remainders appropriately as they learn to do in Year 4.

Picture examples

Dividing by 10, 100 and 1000	Short division without remainders	Short division with remainders
		

Lesson videos

Year 6	**<u>In Year 6,</u>** pupils should continue to practise dividing any whole number with up to 4 digits by a 1-digit number using short division. This should be extended in Year 6 so that pupils can use the long division method for more complex calculations. Pupils should also be accustomed to expressing a remainder in different ways. *Pupils should be fluent in interpreting contextual problems to decide when division is the appropriate operation to use, including as part of multi-step problems. In addition, pupils should be able to interpret remainders appropriately as they learn to do in Year 4. This should be extended to making an appropriate decision about how to represent the remainder to solve problems.* *Pupils should also learn to check their short and long multiplication calculations with a calculator so that they know how to use one. This will help pupils when they progress to Key Stage 3.*	*Picture examples*	<u>Dividing by 10, 100 and 1000</u> 	<u>Short division</u> 	<u>Short division with remainders expressed as proper fractions and decimal fractions</u> 	<u>Long division</u> 
		Lesson videos				