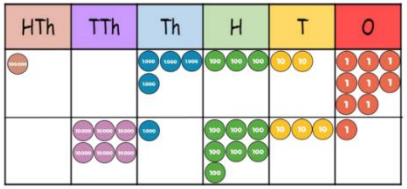
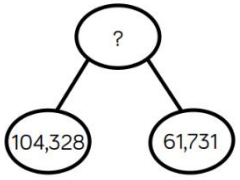
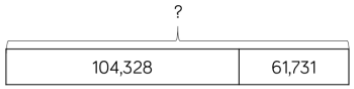
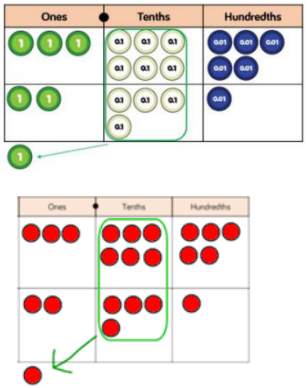
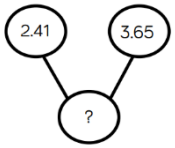
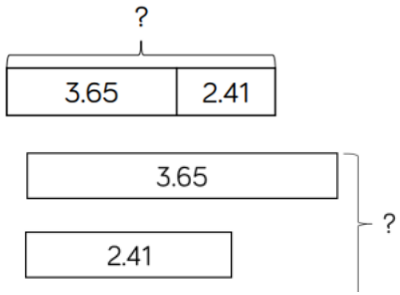
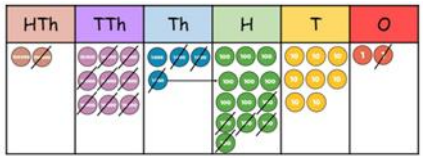
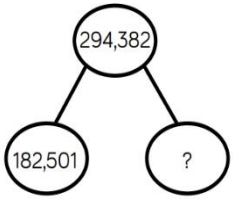
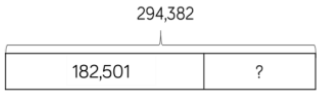
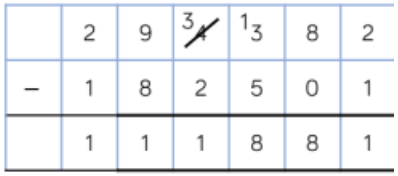
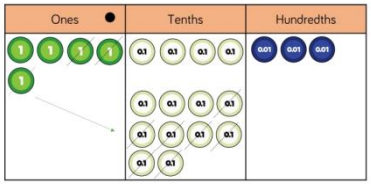
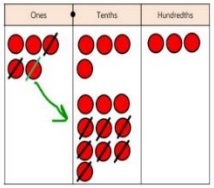
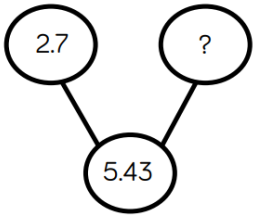
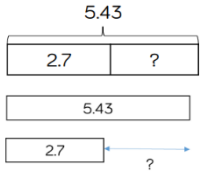
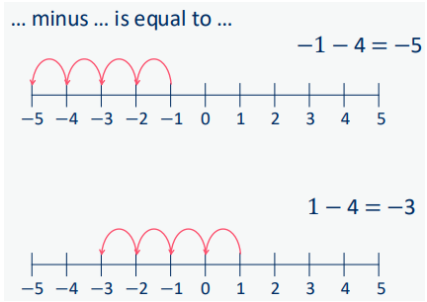
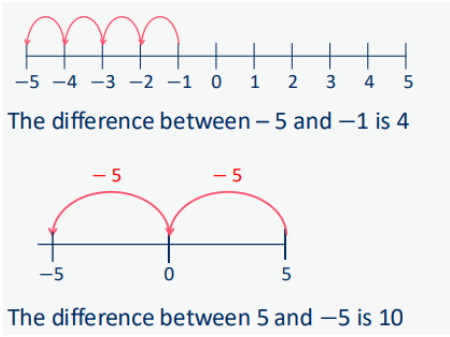
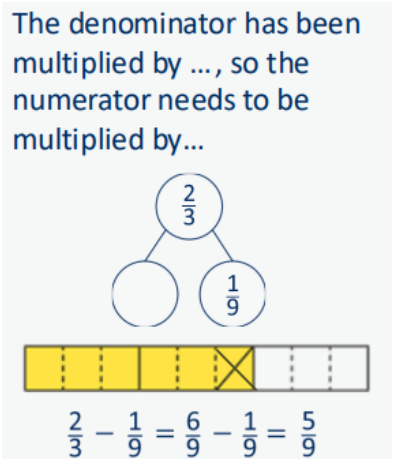
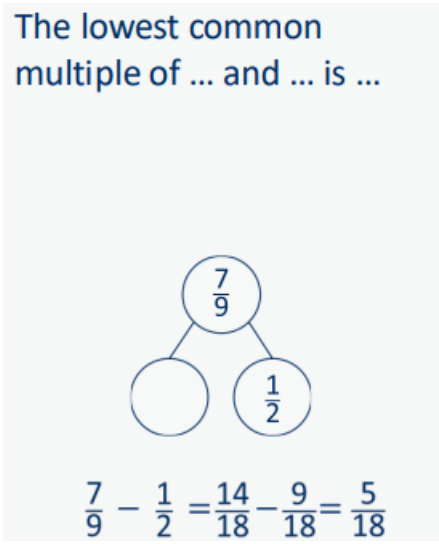
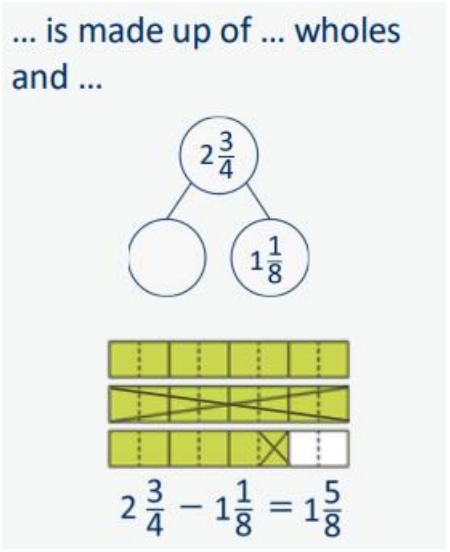
ADDITION YEAR 6

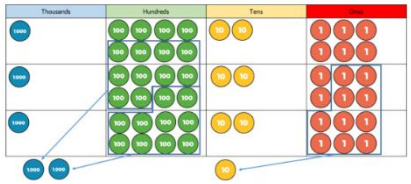
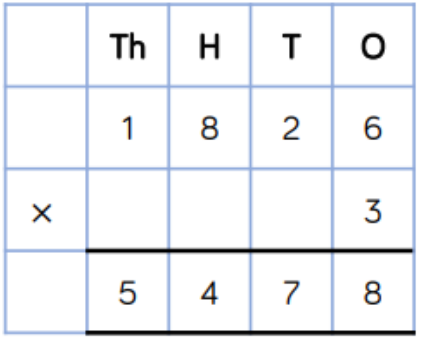
Objective & Strategy	Concrete	Pictorial	Abstract
Add numbers with at least 4 digits By Year 6, most children are encouraged to work in the abstract using the column method to add large numbers. Some children may be able to work mentally	 Place value counters on a place value grid	 Part, Part Whole Models  Bar Model	1 0 4 3 2 8 + 6 1 7 3 1 1 6 6 0 5 9 1
Add with up to 3 decimal places $3.65 + 2.41 = 6.06$ At this stage, most children are encouraged to work in the abstract using the column method to add large numbers. Some children may be able to work mentally. Decimals are put into context: eg: money & measure	 Place value counters or plain counters on a place value grid	 Part, Part Whole Model  Bar Models	3.65 + 2.41 6.06 1

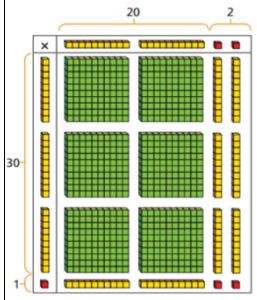
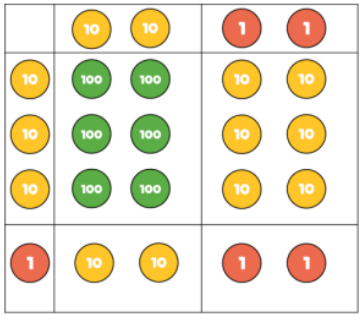
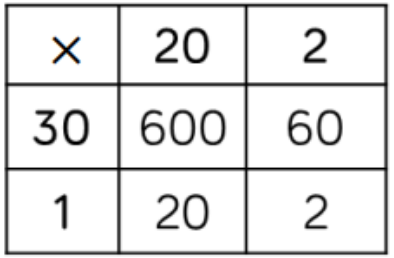
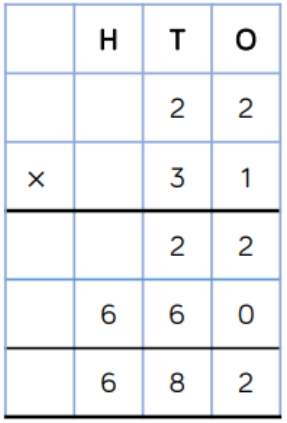
SUBTRACTION YEAR 6

Objective & Strategy	Concrete	Pictorial	Abstract
Subtract numbers with at least 4 digits. 294,382 – 182,501 = 111,881 By Year 6, most children are encouraged to work in the abstract using the column method to subtract to subtract numbers efficiently.	 Place value counters or plain counters on a place value grid. This reinforces the idea of exchanging. For example, by changing a hundreds counter for 10 tens counters to give sufficient 'tens' to enable the subtraction.	 Part, Part Whole Model  Bar Model	
Subtract numbers with up to 3 decimal places 5.43 – 2.7 = 2.73 At this stage, most children are encouraged to work in the abstract using the column method to subtract to subtract numbers efficiently. Children are given opportunities to subtract decimal numbers in the context of money and measure.	  Place value counters or plain counters on a place value grid .	 Part, Part Whole Model  Bar Models	$\begin{array}{r} {}^{4}\not{5}.{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$ When writing the columns, children are taught to ensure the decimal points all line up.

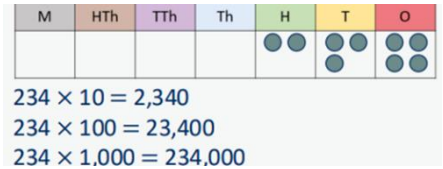
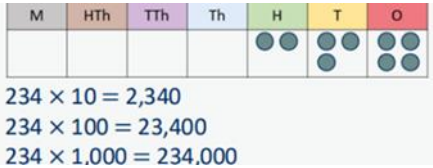
Objective & Strategy	Concrete	Pictorial	Abstract
Subtractions involving Negative numbers Children subtract from positive and negative numbers and calculate intervals across 0			-5 – 6 =-11 I have £11 in my bank account and buy a book for £15. What is the balance of my bank account? 11 – 15 = -4 My bank balance is -£4.00
Subtract Fractions Children need to convert fractions to the same denominator before subtracting. Progress from fractions where one denominator is a multiple of the other, to any fractions and then subtracting from a mixed number			

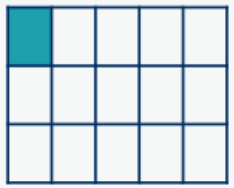
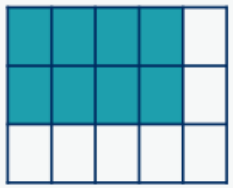
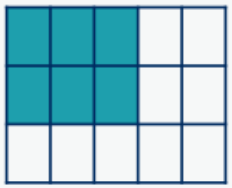
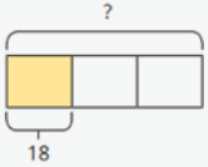
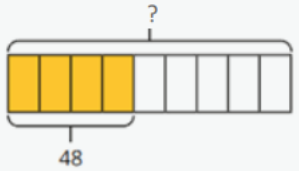
MULTIPLICATION YEAR 6

Objective & Strategy	Concrete	Pictorial	Abstract
Multiply a 2,3,or 4-digit number by a 1-digit number. $1{,}826 \times 3 = 5{,}478$ For children who continue to benefit from using manipulatives, place value counters provide the best support. By Year 6, children should have a rapid and accurate recall of the times tables facts, but some children may still need to use a times tables square for support. Most children are encouraged to use the short multiplication method for accuracy.	 Place Value counters on a Place Value grid 		

Objective & Strategy	Concrete	Pictorial	Abstract
Multiply a 2 or 3-digit number by a 2-digit number $22 \times 31 = 682$ Some children may benefit from using Dienes blocks and sticks to help them visualise the calculation. This links to finding the area of a rectangle as the Dienes blocks fill the space covered. However, place value counters and a place value grid are a more efficient concrete method. Grids are not encouraged in Year 6, but may still be used to help children picture the calculation. Most children by Year 6 are encouraged to use abstract methods and develop a confident and accurate use of formal long multiplication	 Dienes (base 10) blocks.  Place Value counters on a Place Value grid.	 	

Objective & Strategy	Concrete	Pictorial	Abstract
Multiply a 4-digit number by a 2-digit number $2{,}739 \times 28 = 76{,}692$ When multiplying a 4-digit number by a 2-digit number children should be confident in using a formal method of long multiplication. A times tables square may still be used if children have not yet secured a sound working knowledge of the tables. It is important that children are taught to consistently place exchanged digits. This will avoid confusion.			TTh Th H T O 2 7 3 9 × 2 8 2 1 9 1 2 2 5 3 7 5 4 1 8 0 7 6 6 9 2 1

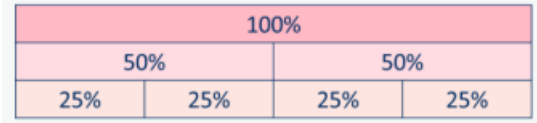
Objective & Strategy	Concrete	Pictorial	Abstract
Multiply by 10, 100 and 1,000 Some children may overgeneralise by thinking that multiplying by a power of 10 always results in more adding zeros. It is important that children understand that each digit will move the same number of places to the left on the place value grid as there are zeros in the multiplier. Eg: • multiply by 10 = each digit moves 1 place to the left as there is one zero in 10. • Multiply by 1,000 = each digit moves 3 places to the left as there are 3 zeros in 1,000 By Year 6, most children will have grasped the concept of moving each digit 1, 2 or 3 places to the left on the place value chart and will be able to calculate these multiplications in their heads.	 Use Place Value Counters on a Plave Value grid so the counters can be physically manipulated (moved 1, 2, 3 places to the left)	 Draw the counters or write the number on the place value grid and make the jumps pictorially.	234 × 10 = 2,340 234 × 100 = 23,400 234 × 1,000 = 234,000

Objective & Strategy	Concrete	Pictorial	Abstract
Multiply fractions by Fractions By Year 6, most children understand the concept of multiplying the numerators and then multiplying the denominators. Children are encouraged to give answers in their simplest form.	 $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$  $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$  $\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$		When multiplying a pair of fractions, I need to multiply the numerators and then multiply the denominators. $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ I then need to check if I can simplyfy the fraction by looking for common factors between the numerator and the denominator. $\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$
Find the whole when given a fraction Children multiply to find the whole from a given part.	If $\frac{1}{\square}$ is … , then the whole is … × … $\frac{1}{3}$ of ___ = 18  18 × 3 = 54 $\frac{1}{3}$ of **54** = 18	If $\frac{\square}{\square}$ is … , then $\frac{1}{\square}$ is … and the whole is … × … $\frac{4}{9}$ of ___ = 48  $\frac{1}{9} = 48 \div 4 = 12$ 9 × 12 = 108 $\frac{4}{9}$ of **108** = 48	

Calculate Percentages

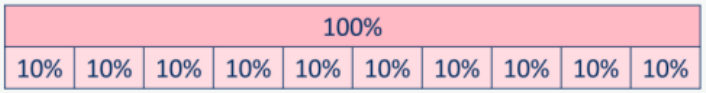
Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.

There are … lots of … % in 100%
To find … %, I need to divide by …



50% of … = …÷ 2
25% of … = …÷ 40

… % is made up of … %, and … %



To find 30%, I can find 10% and then multiply it by 3
To find 23%, I can use 10% × 2 and 1% × 3
To find 99%, I can find 1%, then subtract from 100%

Calculations involving Ratio

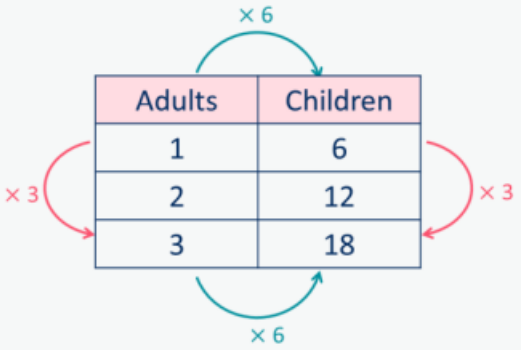
Children are encouraged to see the multiplicative relationship between ratios.

Children need to multiply or divide each value by the same number to keep the ratio equivalent.

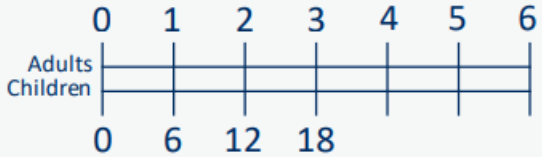
Double number lines and ratio tables help children to see both horizontal and vertical multiplicative relationships.

For every … , there are …

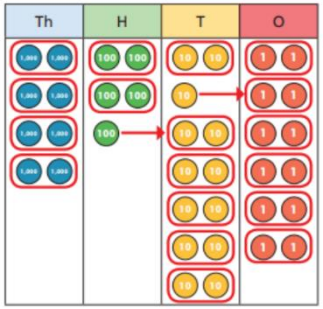
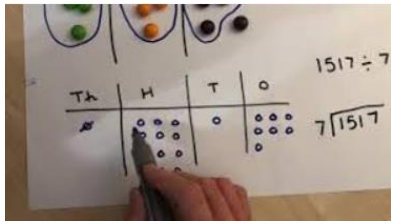
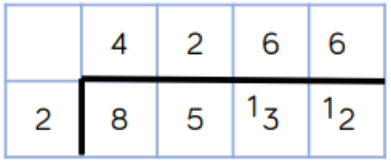
For every 1 adult on a school trip, there are 6 children.

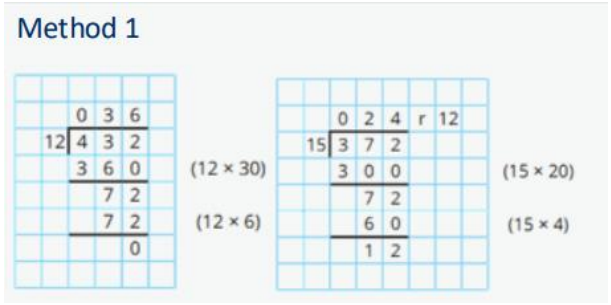
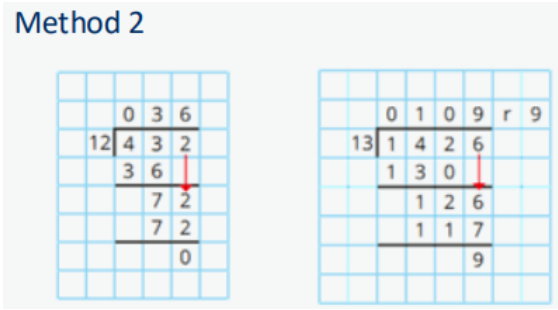
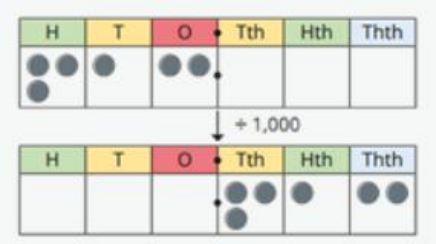
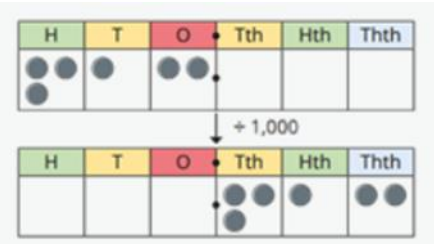


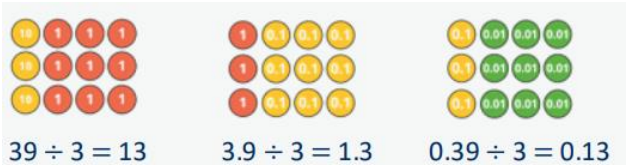
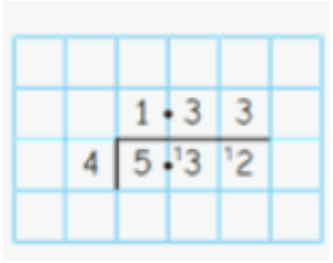
The ratio of adults to children is 1 : 6

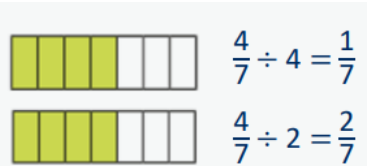


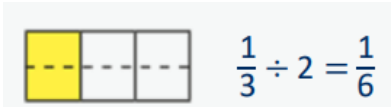
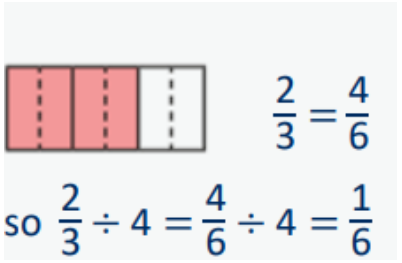
DIVISION YEAR 6

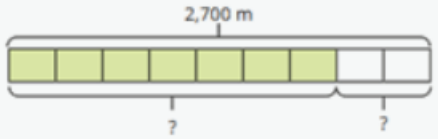
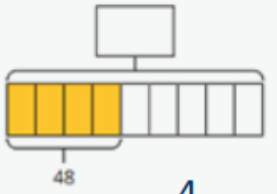
Objective & Strategy	Concrete	Pictorial	Abstract
Divide a 4-digit number by 1-digit number **8,532 ÷ 2 = 4,266** **(short division)** Place value counters or plain counters can be used on a Place Value grid to support children in visualising the calculation. Children could also draw counters on an empty Place Value grid through a pictorial method. However, in upper Key Stage 2, children are taught to use a more formal method of short division – especially where multiple exchanges are required.		 Pictorial method	 Formal short division method using the division symbol which resembles a 'bus stop'.

Objective & Strategy	Method 1	Method 2	
Long Division The long division method is introduced for the first time. Two alternative methods are shown.			
Objective & Strategy	**Concrete**	**Pictorial**	**Abstract**
Divide by 10, 100 and 1,000 Children are encouraged to notice that dividing by 100 is the same as dividing by 10 twice, and that dividing by 1,000 is the same as dividing by 10 three times.	To divide by … , I move the digits … places to the right.  Use place value counters on the place value grid	To divide by … , I move the digits … places to the right  Children draw on the place value grid..	312 ÷ 10 = 31.2 312 ÷ 100 = 3.12 312 ÷ 1,000 = 0.312 906 ÷ 10 = 90.6 906 ÷ 100 = 9.06 906 ÷ 1,000 = 0.906

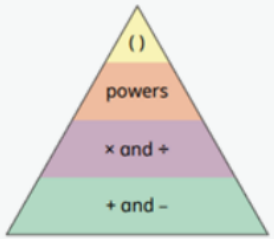
<table>
<tr><th>Objective & Strategy</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr><td>Divide decimals by integers
Year 6 is the first time children divide decimals by numbers other than 10, 100 or 1,000</td><td colspan="2">I know that …÷ … = …,
so I also know that …÷ … = …
 
$39 \div 3 = 13$ $3.9 \div 3 = 1.3$ $0.39 \div 3 = 0.13$</td><td>  </td></tr>
<tr><td>Divide a fraction by an Integer

This is the first time children divide fractions by an integer.</td><td>… ones divided by 2 is … ones so … sevenths divided by 2 is … sevenths
(8 ones divided by 2 is 4 ones So 8 sevenths divided by 2 is 4 sevenths)
 
$\frac{4}{7} \div 4 = \frac{1}{7}$
$\frac{4}{7} \div 2 = \frac{2}{7}$</td><td>I am dividing by … , so I can split each part into … equal parts.

(I am dividing by 2 so I can split each part into 2 equal parts).
 
$\frac{1}{3} \div 2 = \frac{1}{6}$</td><td>… is equivalent to….
….. so … ÷ …. is equivalent to …. ÷ ….
 
$\frac{2}{3} = \frac{4}{6}$
so $\frac{2}{3} \div 4 = \frac{4}{6} \div 4 = \frac{1}{6}$</td></tr>
</table>

Find a fraction of an amount Children divide and multiply to find fractions of an amount. Bar models can still be used to support understanding if needed	To find $\frac{1}{\square}$ I divide by … $\frac{1}{2}$ of $36 = 36 \div 2$ $\frac{1}{12}$ of $36 = 36 \div 12$ Divide by the denominator	If $\frac{1}{\square}$ is equal to …, then $\frac{\square}{\square}$ are equal to …  $\frac{7}{9}$ of $2{,}700 = \frac{1}{9}$ of $2{,}700 \times 7$	If $\frac{\square}{\square}$ is equal to …, then the whole is equal to …  $\frac{4}{9}$ of $\_\_ = 48$

ORDER OF OPERATIONS YEAR 6

Objective & Strategy	Concrete	Pictorial	Abstract
Order of operations Calculations in brackets should be done first, then powers. Multiplication and division should be performed before addition and subtraction.	BIDMAS **B**rackets **I**ndices (powers) **D**ivision **M**ultiplication **A**ddition **S**ubtraction	… has greater priority than …, so the first part of the calculation I need to do is …   $(6 + 4) \div 2 = 5$  $6 + 4 \div 2 = 8$	