Year 5			
	Block 1	Block 2	Block 3
Calculation content	MULTIPLICATION AND DIVISION (UNIT 1) • 9 × table (r) • Understanding division and recalling division facts • Remainders (r) *(The rest of Block 1 focuses on problem solving, factors, multiples, prime numbers and square numbers.)* FRACTIONS (UNIT 1) • Finding non-unit fractions of quantities MULTIPLICATION AND DIVISION (UNIT 2) • Multiplying and dividing by 10, 100 and 1,000 • Multiplying 4-digit numbers	MONEY AND DECIMALS (UNIT 1) n/a MULTIPLICATION AND DIVISION (UNIT 3) • Scaling multiplication and division facts by one-tenth and one-hundredth • Multiplying 2-digit numbers by 2-digit numbers (open arrays, grid method and expanded column method) • Dividing numbers with up to 4 digits by 8 • Dividing numbers with up to 4 digits FRACTIONS (UNIT 2) • Multiplying proper fractions by whole numbers • Multiplying mixed numbers by whole numbers	CALCULATION UNIT • Multiplying 3- and 4-digit numbers by 2-digit numbers • Division (r) ○ Division methods for division of numbers with up to 4 digits; related facts; remainders MONEY AND DECIMALS (UNIT 2) n/a

Year 5			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	9 × table (r) Multiplication and division (Unit 1) focuses mainly on problem solving, factors, multiples, prime numbers and square numbers. Two lessons focus primarily on calculation. Revision of the 9 × table consolidates understanding from earlier year groups. This includes the distributive property of multiplication, through partitioning arrays: 7 × 9 = 5 × 9 + 2 × 9. The distributive property allows a factor in a multiplication expression to be decomposed into two or more numbers, and those numbers can be multiplied by the other factor in the multiplication expression. Children's understanding of the commutative property is developed through interpreting representations on multiplication grids in two ways, eg: 7 × 9 = 63 9 × 7 = 63	Scaling multiplication and division facts by one-tenth and one-hundredth Children have had lots of experience of combining known additive and multiplicative facts with unitising in tens and hundreds. Here they learn to combine known multiplicative facts with unitising in tenths and hundredths. Accurate use of language is key. *0.04 × 3 = 4-hundredths × 3 = 12-hundredths.* *12-hundredths is made up of 10-hundredths and 2-hundredths.* *10-hundredths (10/100) is equal to one-tenth.* *So we have one-tenth and 2-hundredths.* *We have 0.12.*	Multiplying 3- and 4-digit numbers by 2-digit numbers The final calculation unit develops understanding of long multiplication to include the compact method for numbers with up to 4-digits. Calculations are represented using arrays to ensure conceptual understanding of the multiplication process and attribute meaning to the long multiplication procedure. The array is used on its own and then alongside the formal algorithm for long multiplication. The process for each is the same: multiply the ones; multiply the tens; multiply the hundreds. Accurate use of language is key. Children are very familiar with multiplying by ones in the column layout, eg: 2 ones × 3 = 6 ones; 3 tens × 3 = 9 tens; 1 hundred × 3 = 3 hundreds. *Continued on next page.*

Year 5			
	Block 1	Block 2	Block 3
Strategies/ methods	Understanding division and recalling division facts Initial learning about division revisits the two division structures, sharing and grouping, encountered in earlier years. The multiplication grid is used to obtain division facts. Children interpret the same array to obtain different division facts, eg: 56 squares put into groups of 7 results in 8 groups. 56 squares put into groups of 8 results in 7 groups. Children continue to use partitioning to obtain division facts that cannot be derived automatically from multiplication facts. This is done by partitioning the dividend into parts that are multiples of the divisor, eg: 117 ÷ 9 = 90 ÷ 9 + 27 ÷ 9. Initially arrays are used to support understanding of the partitioning. Later numeric representations are used. Another method for division, using factors, is also encountered.	Multiplying a 2-digit number by a 2-digit number (open arrays, grid method and expanded column method) Learning to multiply a 2-digit number by a 2-digit number is introduced with an array. (The initial array enables children to see all the parts – teaching moves on to using open arrays.) The open array supports conceptual understanding of the process of multiplying a 2-digit number by a 2-digit number. The grid method reflects the open array very strongly, with the key difference being that the size of the parts in the grid method are not to scale. Children are very familiar with the expanded column method for multiplying a number by a 1-digit number and the expanded method is now used to multiply a 2-digit number by a 2-digit number. Teaching models accurate use of language to ensure conceptual understanding	They also have considerable experience of multiplying by multiples of ten, but not recording in the column layout. Again, accurate use of language is key: 2 ones × 20 = 40 ones = 4 tens; 3 tens × 20 = 60 tens = 6 hundreds = 600; 1 hundred × 20 = 20 hundreds = 2,000 The grid method continues to be used. Whilst it is not the prime strategy, children are encouraged to make connections between the grid representation and the algorithm for long multiplication. Initial examples have no exchanging in the multiplication part of the algorithm. Exchanging is introduced later on.

Year 5			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	Remainders Remainders were introduced in Year 4 (Block 1 (Unit 2). Revisit key teaching points: • if the dividend is a multiple of the divisor there is no remainder; • if the dividend is not a multiple of the divisor there is a remainder; • the remainder is always less than the divisor. Finding non-unit fractions of quantities Children were introduced to finding non-unit fractions of quantities in Year 4. This was done using division facts linked to multiplication tables from Year 2 and Year 3. In Year 5, children find non-unit fractions of quantities using division facts linked to the 6, 9 and 7 multiplication tables. They also find non-unit fractions of quantities for calculations that go beyond known multiplication table facts.	Dividing numbers with up to 4 digits Children have experience of all three methods used. The difference is that they are now applied to numbers with up to 4-digits. Partitioning supports conceptual understanding about division. The dividend is partitioned into parts that are divisible by the divisor. There is no set number of parts to partition the dividend into. Children need to think about partitioning in non-standard ways. Understanding of the short division method is enhanced by accurate use of language.	Methods for division (r) Learning about division consolidates understanding of division from earlier in the year. Teaching revisits division of numbers with 4 digits, related facts (same multiplicative change to the dividend and the divisor meaning the resulting quotient stays the same) and remainders.

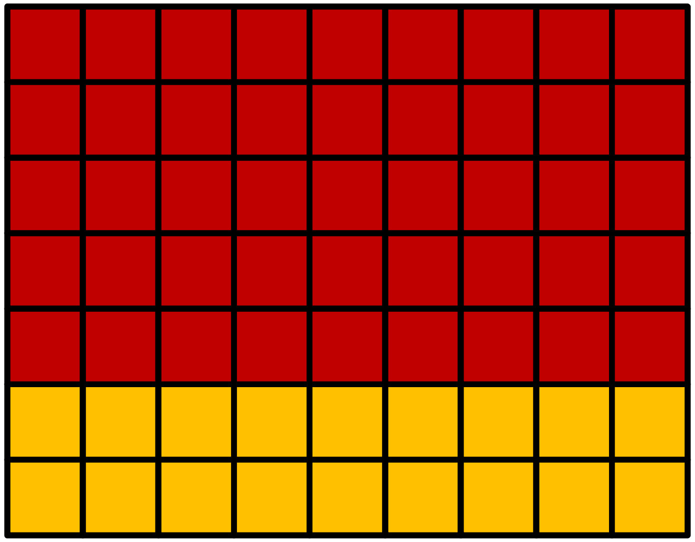
Year 5			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	Multiplying and dividing by 10, 100 and 1,000 Multiplying and dividing by 10 and 100 was introduced in Money and Decimals (Unit 1) in Year 4. In Year 5 learning is extended to include multiplying and dividing by 1,000. Teaching develops understanding of relationships between powers of ten, and models describing them using scaling language, eg: … times the size. Contexts involve both whole numbers and decimal numbers.	Multiplying proper fractions by whole numbers Initial work on multiplying proper fractions focuses on using repeated addition and the associated multiplication expression. The emphasis is on the conceptual understanding associated with multiplying fractions and to begin with children are not encouraged to find the answer/product. Work begins with unit fractions and progresses to non-unit fractions. The pictorial representations are then removed and learning continues in the same manner. Next finding the product (answer) is introduced. Children learn that the numerator of the fraction is multiplied by the whole number and the denominator remains the same. Learning moves on to consider examples where the product is more than one whole.	

Year 5			
	Block 1	Block 2	Block 3
Strategies/ methods	Multiplying 4-digit numbers Multiplying a 3-digit number by a 1-digit number was learnt during Year 4. Learning to multiply 4-digit numbers begins with the expanded column method and then moves to the compact method. The expanded method supports conceptual understanding of the compact column method. Accurate use of language is key to ensuring conceptual understanding. For example: *9 ones × 3 = 27 ones. 27 ones = 2 tens and 7 ones.* *6 tens × 3 = 18 tens. Plus the 2 tens that were exchanged which makes 20 tens. 20 tens = 2 hundreds and 0 tens.* etc	Multiplying mixed numbers by whole numbers Learning to multiply mixed numbers by whole numbers begins with examples where the fractional parts multiply to less than one whole. For example: 3 × 2 3/10 The core strategy modelled is to partition the mixed number into a whole number and a fraction. Multiply the wholes. Multiply the fractional parts. Combine. Next children encounter examples where the fractional parts multiply to more than one whole. For example: 3 × 2 4/10 The same partitioning procedure is used. The initial combining results in the non-conventional format of a mixed number with an improper fractional part. (In this instance, 12 28/20.) Whilst this is structurally correct, explain that convention means we write the mixed number so the numerator is less than the denominator.	

Year 5 - Block 1

7 × 9 = 63

9 × table (r)



ALL: 7 × 9 = 63

PARTS: 5 × 9 = 45

2 × 9 = 18

distributive property of multiplication reinforced through partitioned array

×	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

7 × 9 = 63

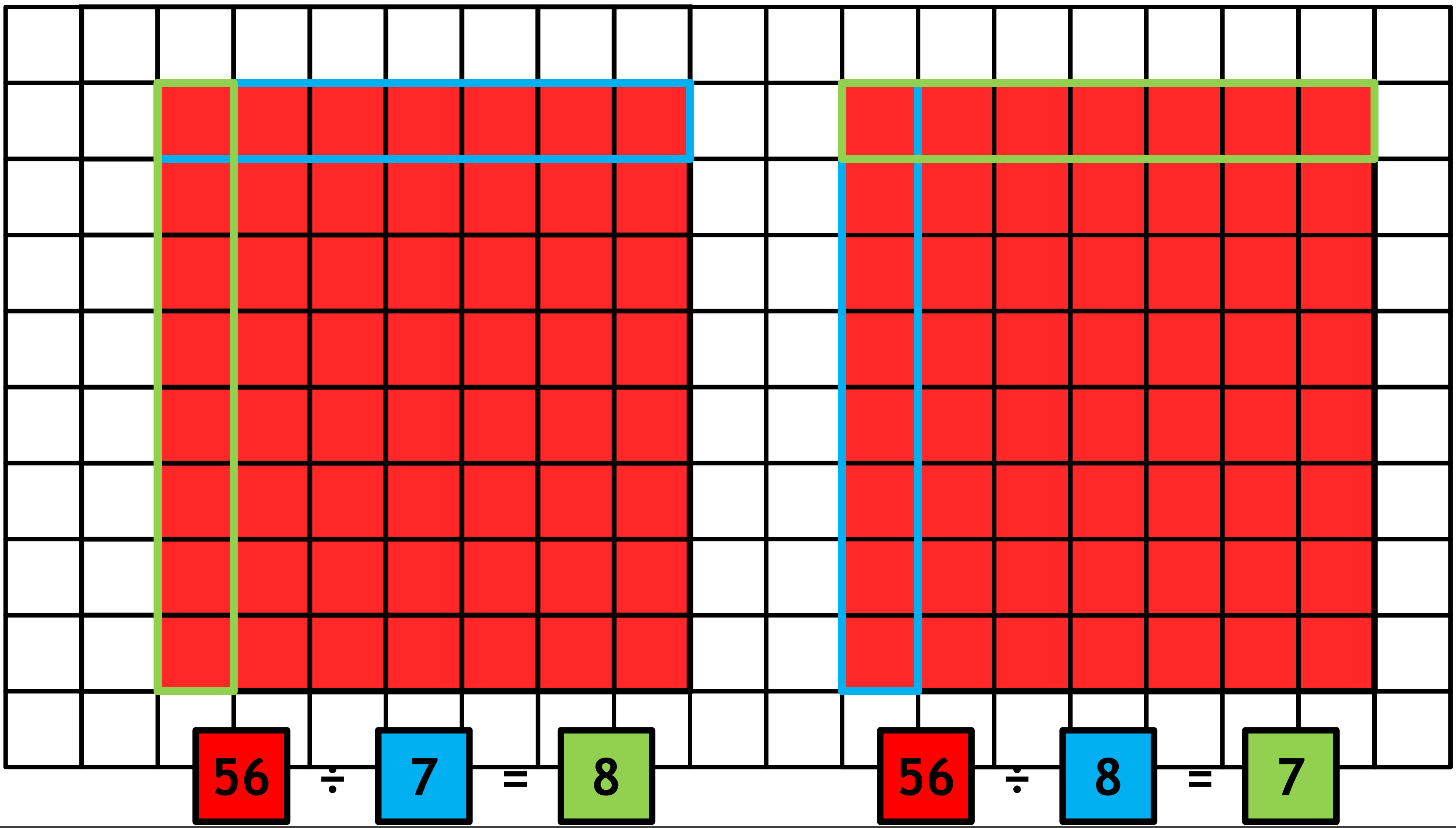
9 × 7 = 63

commutative property

Year 5 - Block 1

56 ÷ 7 = 8 ● 56 ÷ 8 = 7

Understanding division and recalling division facts

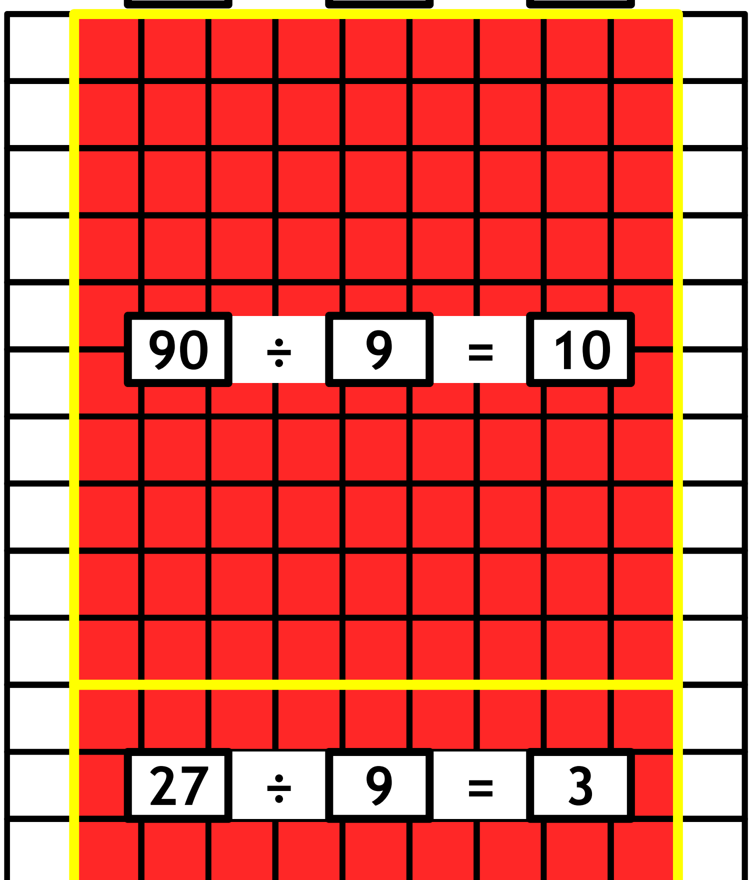


interpreting an array in different ways

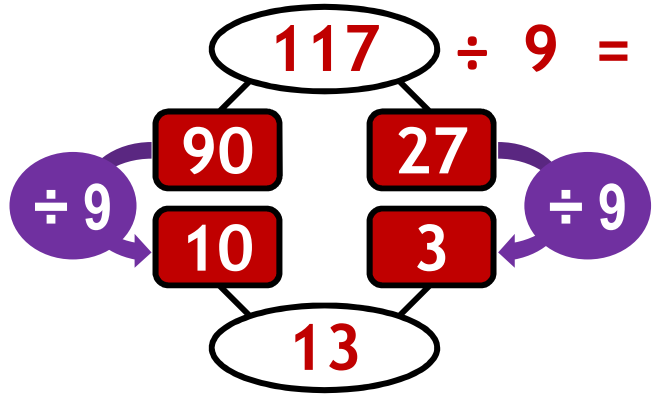
Year 5 - Block 1 — 117 ÷ 9 = 13

<u>Understanding division and recalling division facts</u> (ctd)

117 ÷ 9 = 3



partitioning the dividend to divide using an array



partitioning the dividend to divide - numeric representations

117	÷	9	=	13
90	÷	*9*	=	*10*
27	÷	*9*	=	*3*

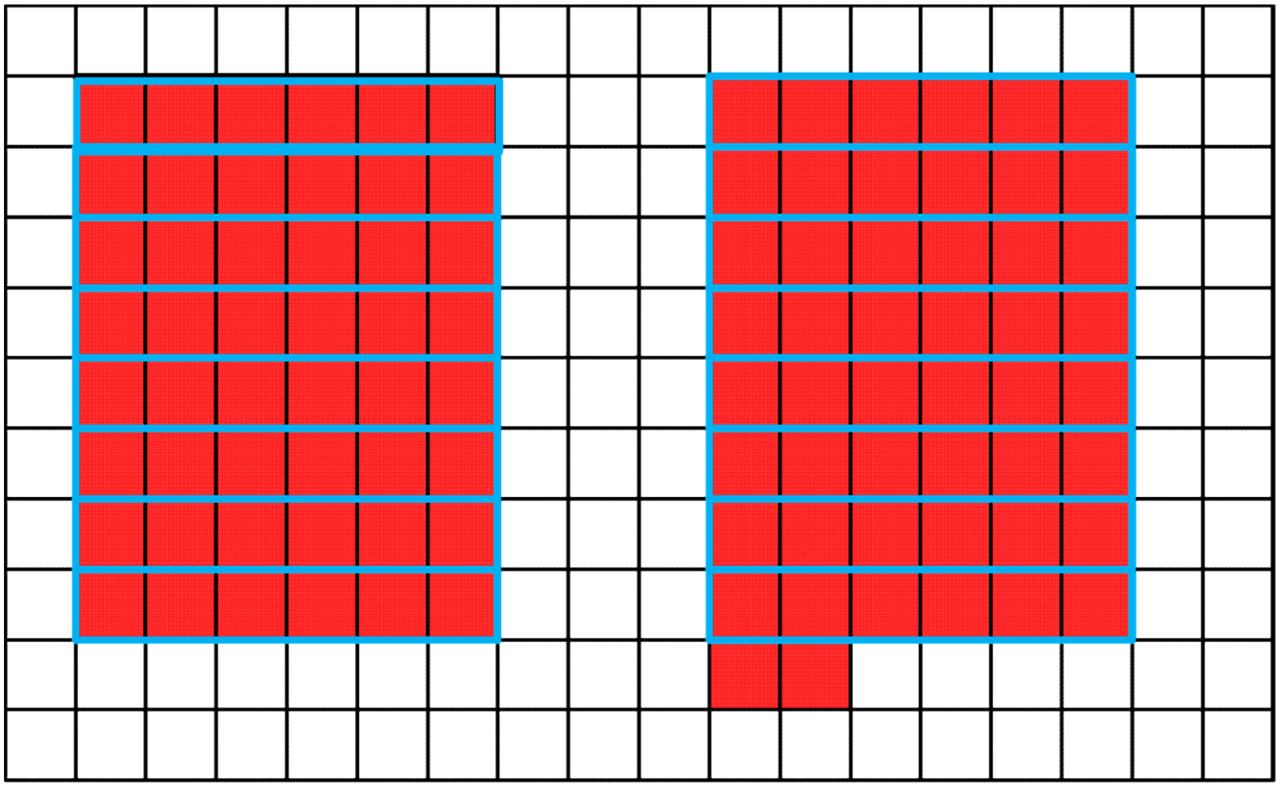
117	÷	9	=			
117	÷	*3*	÷	*3*	=	

39	÷	3	=	13

using factors to divide

Year 5 - Block 1 48 ÷ 6 = 8 ● 50 ÷ 6 = 8 r 2

Remainders



48 ÷ 6 = 8 r 0

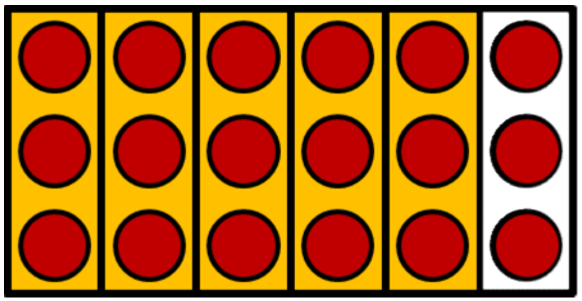
dividend is a multiple of the divisor – there is no remainder

50 ÷ 6 = 8 r 2

dividend is *not* a multiple of the divisor – there *is* a remainder

Year 5 - Block 1

Finding non-unit fractions of quantities



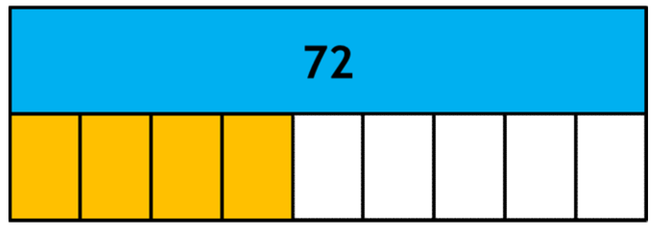
value of a part is visible

The whole is ☐.

The whole is divided into ☐ equal parts.

Each part is ☐ of the whole.

$\frac{5}{6}$ is shaded. $\frac{5}{6}$ of 18 is ☐.



value of a part is *not* visible

The whole is ☐.

The whole is divided into ☐ equal parts.

Each part is ☐ of the whole.

$\frac{4}{9}$ is shaded. $\frac{4}{9}$ of 72 is ☐.

Liam has 180 stamps.

$\frac{2}{9}$ of the stamps are from France.

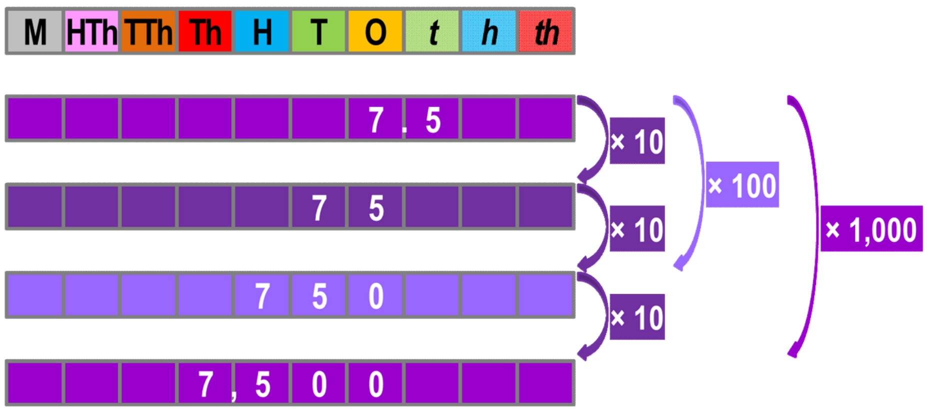
$\frac{1}{3}$ are from England.

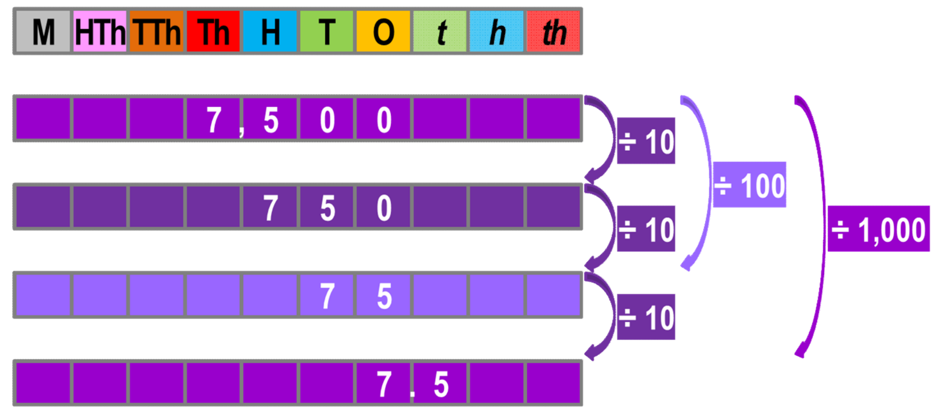
How many stamps are not from France or England?

problem solving

Year 5 - Block 1

Multiplying and dividing by 10, 100 and 1,000





When you multiply a number by 1,000, the value of each digit becomes one thousand times bigger, so each digit moves three places to the left.

When you divide a number by 1,000, the value of each digit becomes one thousand times smaller, so each digit moves three places to the right.

0.1 × 10 = ☐

10 × ☐ = 2,000

0.01 × 100 = ☐

1,000 × ☐ = 20,000

0.001 × 1,000 = ☐

100 × ☐ = 20

Year 5 - Block 1

3,069 × 3 = 9,207

Multiplying and dividing by 10, 100 and 1,000

	Th	H	T	O
	3,	0	6	9
×				3
	9,	2	0	7
		2	2	

Step 1: Multiply the ones

9 ones × 3 = 27 ones

27 ones = 2 tens and 7 ones

Step 2: Multiply the tens

6 tens × 3 = 18 tens

+ 2 tens =

20 tens = 2 hundreds and 0 tens

Step 3: Multiply the hundreds

0 hundreds × 3 = 0 hundreds

+ 2 hundreds =

2 hundreds

Step 4: Multiply the thousands

3 thousands × 3 = 9 thousands

	Th	H	T	O
	3,	0	6	9
×				3
			2	7
		1	8	0
+				0
	9,	0	0	0
	9,	2	0	7
		1		

Year 5 - Block 2

<u>Scaling multiplication and division facts by one-tenth and one-hundredth</u>

$4 \times 3 = 12 \text{ ones} \times 3 = 12$

$0.4 \times 3 =$

$\frac{4}{10} \times 3 = \frac{12}{10} = 1\frac{2}{10} =$

1.2

$0.04 \times 3 =$

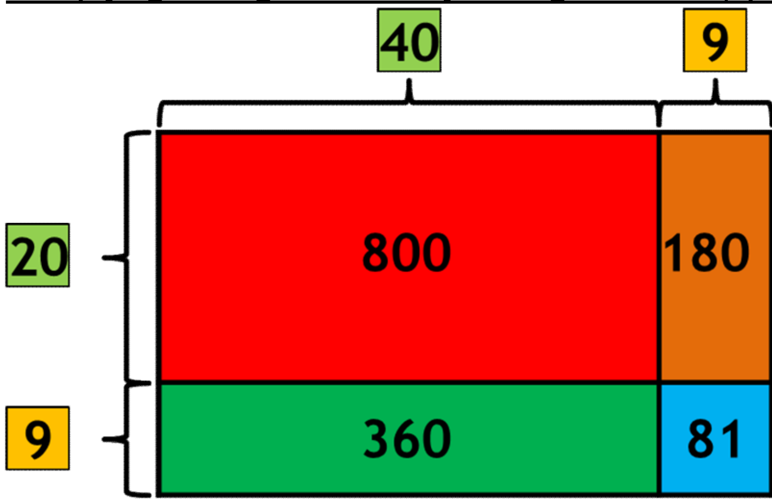
$\frac{4}{100} \times 3 = \frac{12}{100} = \frac{1}{10} + \frac{2}{100} =$

0.12

Year 5 - Block 2

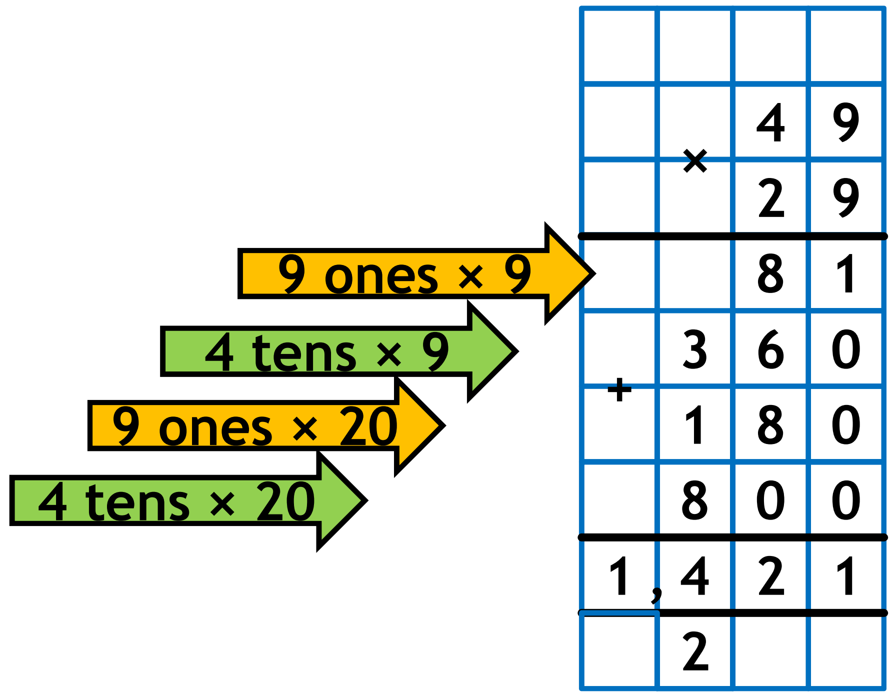
49 × 29 = 1,421

<u>Multiplying a 2-digit number by a 2-digit number (open arrays, grid method and expanded column method)</u>



49 × 29 =

×	40	9	
20	800	180	980
9	360	81	441
			1,421



Year 5 - Block 2 — 3,258 ÷ 6 = 543

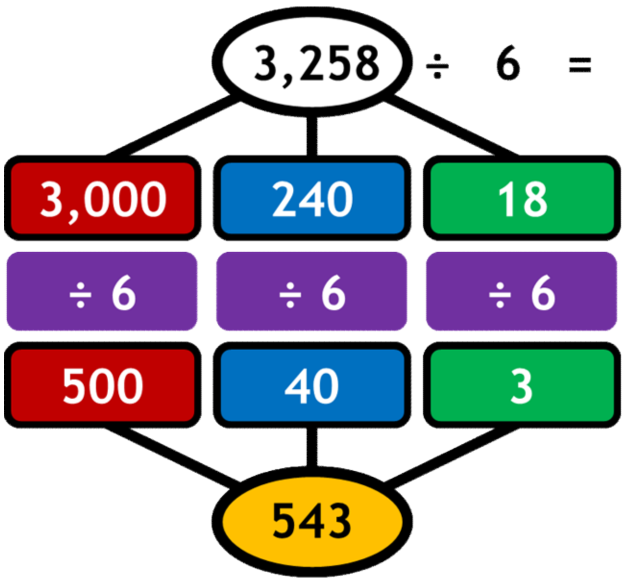
Dividing numbers with up to 4 digits

3,258 ÷ 6 = 3,258 ÷ 2 ÷ 3

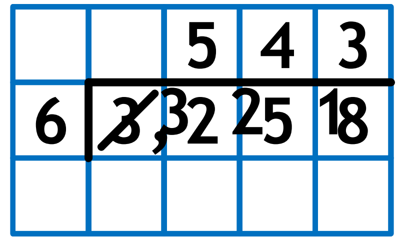
3,258 ÷ 2 = 1,629

1,629 ÷ 3 = 543

using factors



partitioning the dividend



How many groups of 6 can we make from 3 thousands? No groups of 6…

Exchange 3 thousands for 30 hundreds.

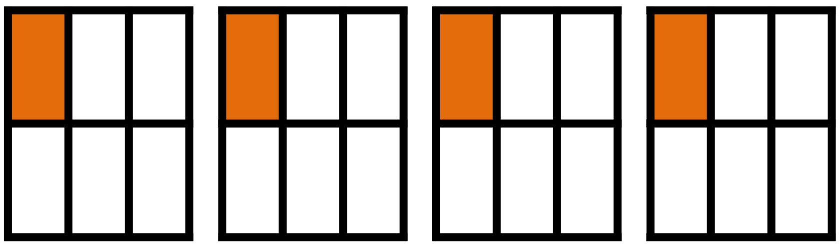
How many groups of 6 can we make from 32 hundreds?
5 groups of 6 hundreds with 2 hundreds left over.
2 hundreds = 20 tens

How many groups of 6 can we make from 25 tens?
4 groups of 6 tens with 1 ten left over.
1 ten = 10 ones

How many groups of 6 can we make from 18 ones?
3 groups of 6 ones.

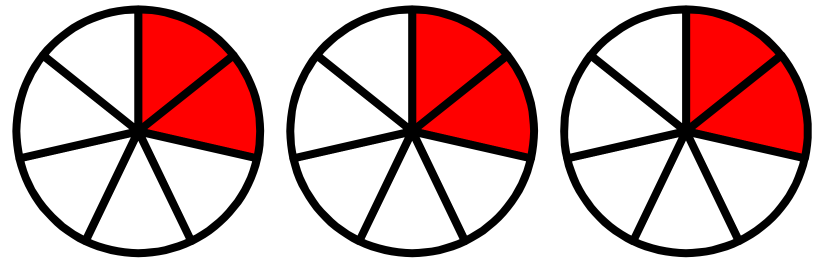
Year 5 - Block 2

Multiplying proper fractions by whole numbers



$$\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}= \quad 4\times\frac{1}{6}= \quad \frac{1}{6}\times 4$$

repeated addition and the associated multiplication expression – unit fractions



$$\frac{2}{7}+\frac{2}{7}+\frac{2}{7}= \quad 3\times\frac{2}{7}= \quad \frac{2}{7}\times 3$$

repeated addition and the associated multiplication expression – non-unit fractions

$$\frac{2}{9}+\frac{2}{9}+\frac{2}{9}+\frac{2}{9}=\square\times\frac{2}{9}$$

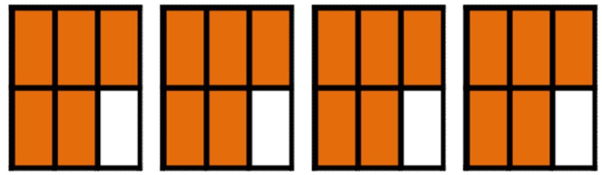
repeated addition and the associated multiplication expression – non-unit fractions and no pictorial representations

$$4\times\frac{2}{9}=\frac{8}{9}$$

finding the product (answer)

Year 5 - Block 2

Multiplying proper fractions by whole numbers (ctd)



$$\frac{5}{6}+\frac{5}{6}+\frac{5}{6}+\frac{5}{6}=$$

$$4\times\frac{5}{6}=\frac{5}{6}\times 4=\frac{20}{6}=3\frac{2}{6}$$

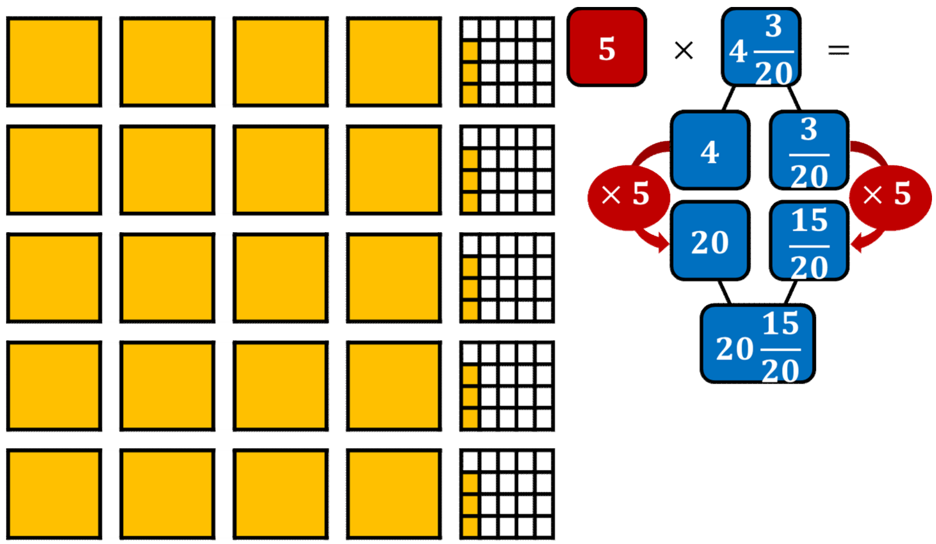
repeated addition, the associated multiplication expression and the product - where the product is more than one whole – pictorial representation supports

$$\frac{9}{15}+\frac{9}{15}+\frac{9}{15}+\frac{9}{15}=\square\times\frac{\square}{\square}=\frac{\square}{\square}=\square\frac{\square}{\square}$$

repeated addition, the associated multiplication expression and the product - where the product is more than one whole – no pictorial representation

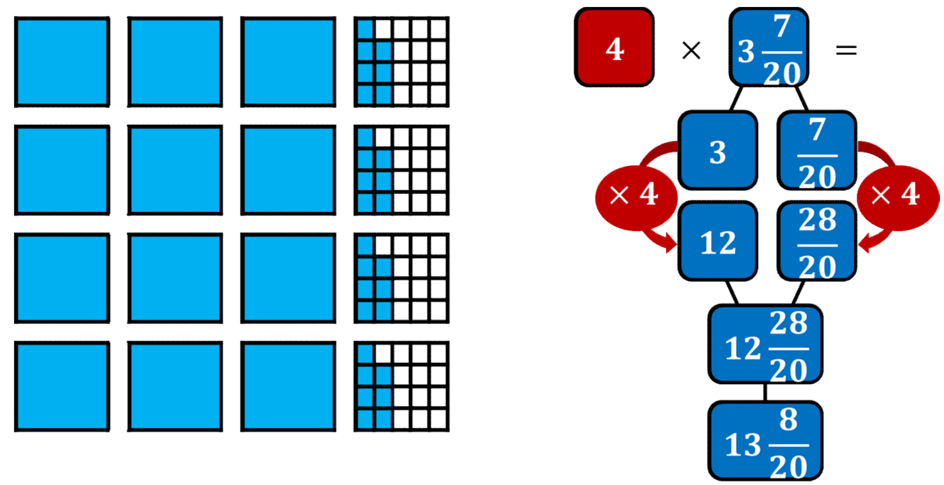
Multiplying mixed numbers by whole numbers

$5 \times 4\,{}^{3}/_{20} = 20\,{}^{15}/_{20}$



partitioning the mixed number –
fractional parts multiply to less than one whole

$4 \times 3\,{}^{7}/_{20} = 13\,{}^{8}/_{20}$

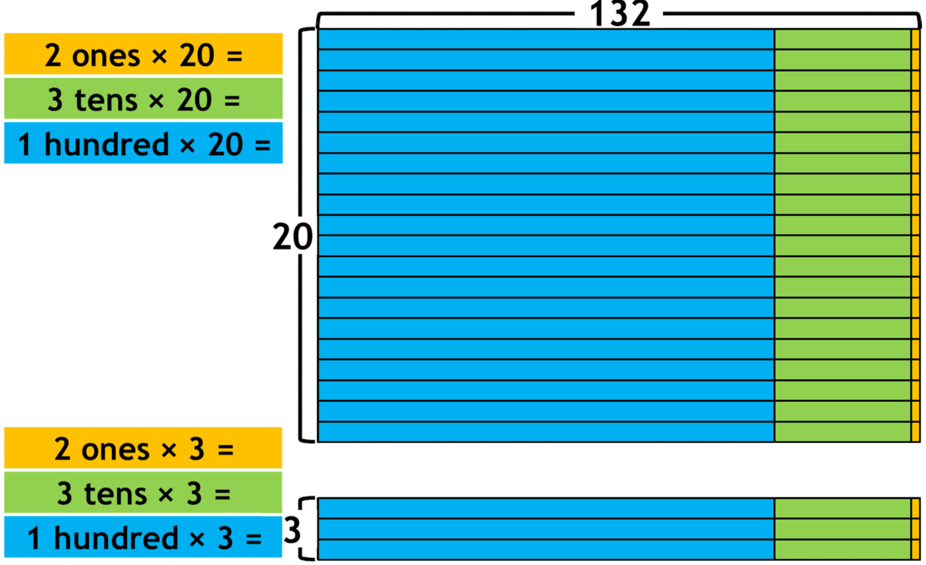


partitioning the mixed number –
fractional parts multiply to more than one whole

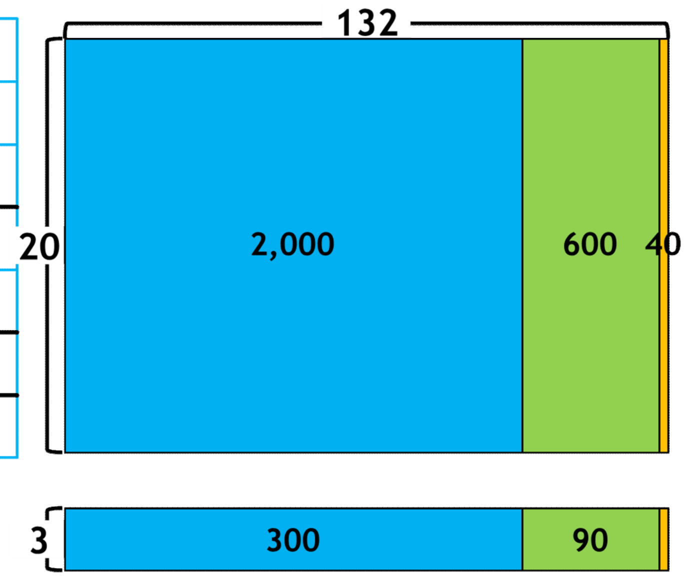
Year 5 - Block 3

132 × 23 = 3,036

Multiplying 3- and 4-digit numbers by 2-digit numbers



	Th	H	T	O
		1	3	2
×			2	3
+		3	9	6
	2,	6	4	0
	3,	0	3	6
	1	1		

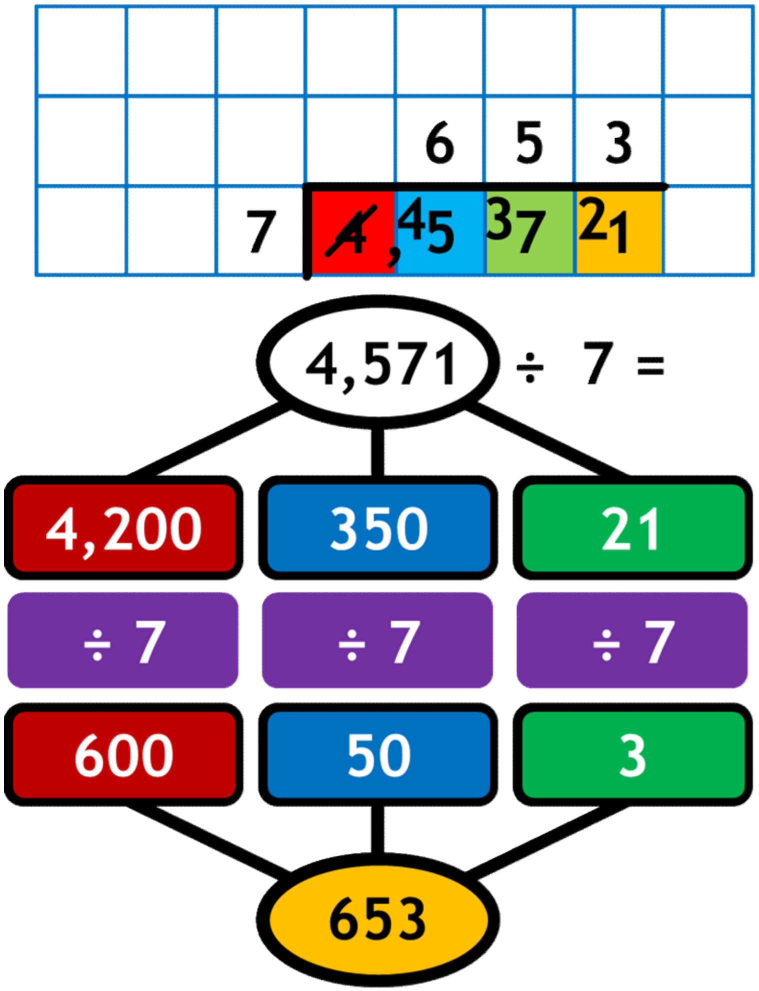


×	100	30	2	
20	2,000	600	40	2,640
3	300	90	6	+ 396
				3,036

Year 5 - Block 3

4,571 ÷ 7 = 653

Methods for division (r)



4 thousands ÷ 7

Not enough thousands… let's exchange 4 thousands for 40 hundreds.

45 hundreds ÷ 7

6 groups of 7 hundreds. 3 hundreds left over.

37 tens ÷ 7

5 groups of 7 tens. 2 tens left over.

21 ones ÷ 7

3 groups of 7 ones.