



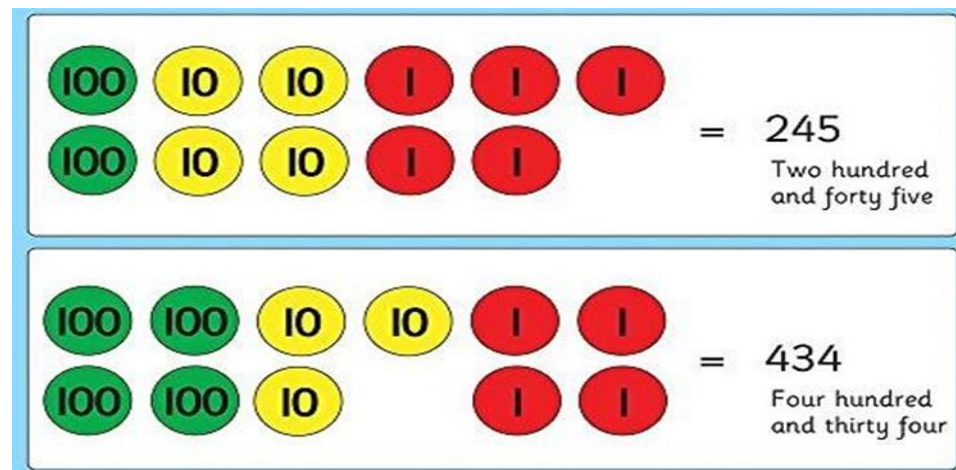
Calculation Policy Year 5 and Year 6



www.teaguesbridgeprimary.org

Maths Calculation Policy Year 5 and Year 6

The following pages show our school's progression in calculation (addition, subtraction, multiplication and division) and how this works in line with the National Curriculum. The consistent use of the concrete, pictorial and abstract approach throughout our school helps children develop mastery across all the operations in an efficient and reliable way. This policy shows how these methods develop children's confidence in their understanding of both written and mental methods.



National Curriculum	Year 5	Year 6
Addition	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p>	<p>Solve problems involving addition, subtraction, multiplication and division.</p>
Subtraction	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p>	<p>Solve problems involving addition, subtraction, multiplication and division.</p>
Multiplication	<p>Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication for 2 digit numbers</p> <p>Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes</p> <p>Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p> <p>Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates</p>	<p>Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the formal written method of long multiplication.</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>
Division	<p>Divide numbers up to 4 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately for the context (as remainders, as fractions, as decimals or by rounding, e.g. $98 \div 4 = 24 \text{ r}2 = 24 \square = 24.5 \approx 25$).</p>	<p>Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate to the context.</p> <p>Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.</p>

	Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates.	Solve problems involving addition, subtraction, multiplication and division.
--	---	--

Key Language	Year 5	Year 6
Addition	<p>Subject specific: put together, add, altogether, double, total, more than, equals, plus, make, commutative, inverse, sum, partition, near double, score, increase</p> <p>Instructional vocabulary: put, place arrange, rearrange change, change over split, separate</p>	<p>Subject specific: put together, add, altogether, double, total, more than, equals, plus, make, commutative, inverse, sum, partition, near double, score, increase</p> <p>Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate carry on, continue, repeat what comes next? predict describe the pattern, describe the rule, find, find all, find different investigate</p>
Subtraction	<p>Subject specific: subtract, takeaway, distance between, difference between, less than, minus, leave, fewer, left over, equals, tens boundary, partition, rearrange, inverse, hundreds boundary, exchange, carried digits, decrease, units boundary, tenths boundary</p> <p>Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate</p>	<p>Subject specific: subtract, takeaway, distance between, difference between, less than, minus, leave, fewer, left over, equals, tens boundary, partition, rearrange, inverse, hundreds boundary, exchange, carried digits, decrease, units boundary, tenths boundary</p> <p>Instructional vocabulary: put, place arrange, rearrange change, change over adjusting, adjust split, separate carry on, continue, repeat what comes next? predict describe the pattern, describe the rule, find, find all, find different investigate</p>
Multiplication	Subject specific:	Subject specific:

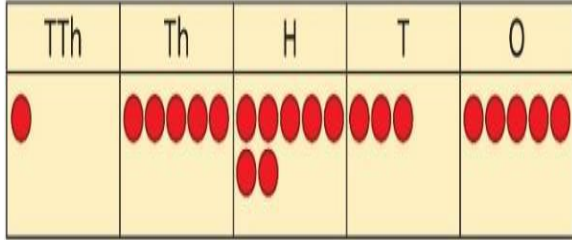
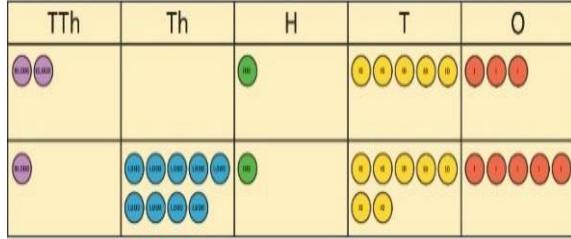
	<p>double, equal groups, array, lots of, odd, even, repeated addition, inverse, commutative, groups of, multiply, multiplied by, multiple of, twice, row, column, tables, factor, related fact, scale, product, factor pair, known fact, derived fact, common factor, prime number, prime factor, composite number, square number, cube number, scale, rate</p> <p>Instructional vocabulary: carry on, continue, repeat what comes next? predict describe the pattern, describe the rule, find, find all, find different investigate</p>	<p>double, equal groups, array, lots of, odd, even, repeated addition, inverse, commutative, groups of, multiply, multiplied by, multiple of, twice, row, column, tables, factor, related fact, scale, product, factor pair, known fact, derived fact, common factor, prime number, prime factor, composite number, square number, cube number, scale, rate, common multiple</p> <p>Instructional vocabulary: carry on, continue, repeat what comes next? predict describe the pattern, describe the rule, find, find all, find different investigate</p>
<p>Division</p>	<p>Subject specific: share, equal groups, array, pairs, divide, divided by, divided into, left over, odd, even, repeated addition, remainder, dividend, divisor, divided into remainder factor, quotient, divisible by inverse</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check same, different missing number/s number facts, number pairs, number bonds greatest value, least value</p>	<p>Subject specific: share, equal groups, array, pairs, divide, divided by, divided into, left over, odd, even, repeated addition, remainder, dividend, divisor, divided into remainder factor, quotient, divisible by inverse, remainders as fractions or decimals</p> <p>Instructional vocabulary: calculate, work out, solve, investigate question, answer, check same, different missing number/s number facts, number pairs, number bonds greatest value, least value</p>

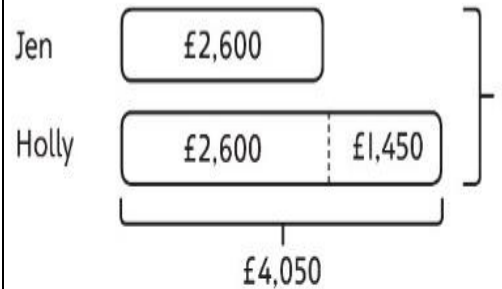
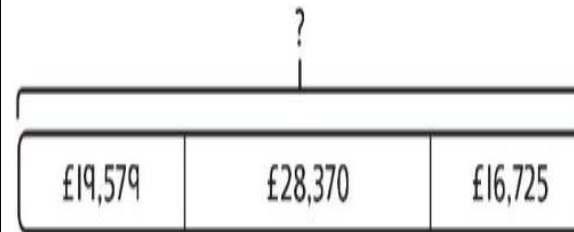
KEYSTAGE 2

In upper Key Stage 2, children build on secure foundations in calculation, and develop fluency, accuracy and flexibility in their approach to the four operations. They work with whole numbers and adapt their skills to work with decimals, and they continue to develop their ability to select appropriate, accurate and efficient operations.

Addition and Subtraction	Multiplication and Division	Fractions
<p>Children build on their column methods to add and subtract numbers with up to seven digits, and they adapt the methods to calculate efficiently and effectively with decimals, ensuring understanding of place value at every stage.</p> <p>Children compare and contrast methods, and they select mental methods or jottings where appropriate and where these are more likely to be efficient or accurate when compared with formal column methods.</p> <p>Bar models are used to represent the calculations required to solve problems and may indicate where efficient methods can be chosen.</p>	<p>Building on their understanding, children develop methods to multiply up to 4-digit numbers by single-digit and 2-digit numbers. Children develop column methods with an understanding of place value, and they continue to use the key skill of unitising to multiply and divide by 10, 100 and 1,000.</p> <p>Written division methods are introduced and adapted for division by single-digit and 2-digit numbers and are understood alongside the area model and place value. In Year 6, children develop a secure understanding of how division is related to fractions.</p> <p>Multiplication and division of decimals are also introduced and refined in Year 6.</p>	<p>Children find fractions of amounts, multiply a fraction by a whole number and by another fraction, divide a fraction by a whole number, and add and subtract fractions with different denominators. Children become more confident working with improper fractions and mixed numbers and can calculate with them.</p> <p>Understanding of decimals with up to 3 decimal places is built through place value and as fractions, and children calculate with decimals in the context of measure as well as in pure arithmetic.</p> <p>Children develop an understanding of percentages in relation to hundredths, and they understand how to work with common</p>

YEAR 3

	Concrete	Pictorial	Abstract
Year 5 Addition			
Column addition with whole numbers	<p>Use place value equipment to represent additions. <i>Add a row of counters onto the place value grid to show $15,735 + 4,012$.</i></p> 	<p>Represent additions, using place value equipment on a place value grid alongside written methods.</p>  <p><i>I need to exchange 10 tens for a 100.</i></p> $\begin{array}{r} \text{TTh Th H T O} \\ \hline 2 \quad 0 \quad 1 \quad 5 \quad 3 \\ + 1 \quad 9 \quad 1 \quad 7 \quad 5 \\ \hline 3 \quad 9 \quad 3 \quad 2 \quad 8 \\ \hline \end{array}$	<p>Use column addition, including exchanges.</p> $\begin{array}{r} \text{TTh Th H T O} \\ \hline 1 \quad 9 \quad 1 \quad 7 \quad 5 \\ + 1 \quad 8 \quad 4 \quad 1 \quad 7 \\ \hline 3 \quad 7 \quad 5 \quad 9 \quad 2 \\ \hline \end{array}$
Representing additions		<p>Bar models represent addition of two or more numbers in the context of problem solving.</p>	<p>Use approximation to check whether answers are reasonable.</p>



$$\begin{array}{r}
 \text{Th H T O} \\
 \hline
 2\ 6\ 0\ 0 \\
 +\ 1\ 4\ 5\ 0 \\
 \hline
 4\ 0\ 5\ 0 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{Th H T O} \\
 \hline
 2\ 6\ 0\ 0 \\
 +\ 4\ 0\ 5\ 0 \\
 \hline
 6\ 6\ 5\ 0 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{TTh Th H T O} \\
 \hline
 2\ 3\ 4\ 0\ 5 \\
 +\ 7\ 8\ 9\ 2 \\
 \hline
 2\ 0\ 2\ 9\ 7 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{TTh Th H T O} \\
 \hline
 2\ 3\ 4\ 0\ 5 \\
 +\ 7\ 8\ 9\ 2 \\
 \hline
 3\ 1\ 2\ 9\ 7 \\
 \hline
 \end{array}$$

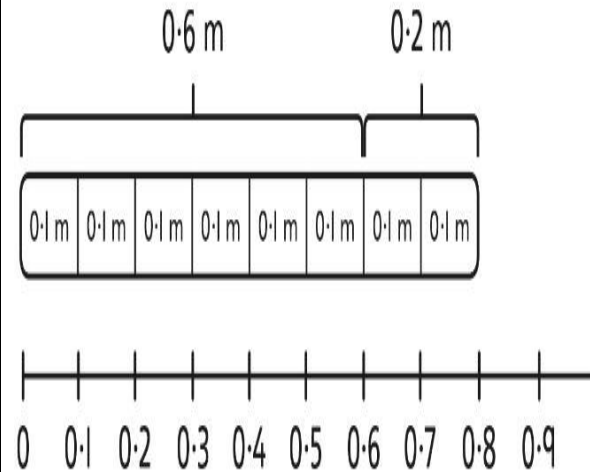
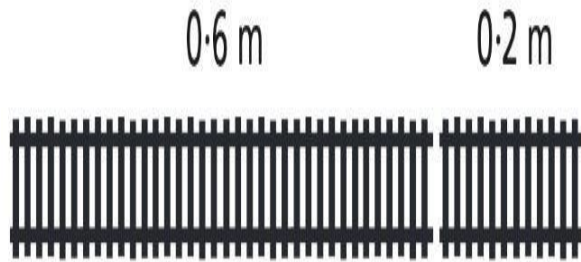
I will use 23,000 + 8,000 to check.

Adding tenths

Link measure with addition of decimals.
*Two lengths of fencing are 0.6 m and 0.2 m.
 How long are they when added together?*

Use a bar model with a number line to add tenths.

Understand the link with adding fractions.



$$\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$$

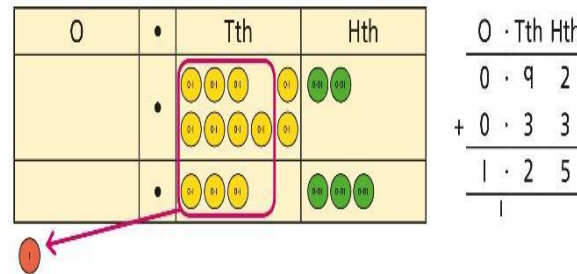
6 tenths + 2 tenths = 8 tenths
 $0.6 + 0.2 = 0.8$

$0.6 + 0.2 = 0.8$
 6 tenths + 2 tenths = 8 tenths

Adding decimals using column addition

Use place value equipment to represent additions.
 Show $0.23 + 0.45$ using place value counters.

Use place value equipment on a place value grid to represent additions.
 Represent exchange where necessary.



Add using a column method, ensuring that children understand the link with place value.

$$\begin{array}{r} \text{O} \cdot \text{Tth} \text{ Hth} \\ \hline 0 \cdot 2 \quad 3 \\ + 0 \cdot 4 \quad 5 \\ \hline 0 \cdot 6 \quad 8 \end{array}$$

Include examples where the numbers of decimal places are different.

0	•	Tth	Hth
●●●●●	•		
●	•	●●	●●●●●

0	•	Tth	Hth
5	•	0	0
+ 1	•	2	5
6	•	2	5

Include exchange where required, alongside an understanding of place value.

0	•	Tth	Hth
0	•	9	2
+	•	0	3
1	•	2	5

Include additions where the numbers of decimal places are different.

$$3.4 + 0.65 = ?$$

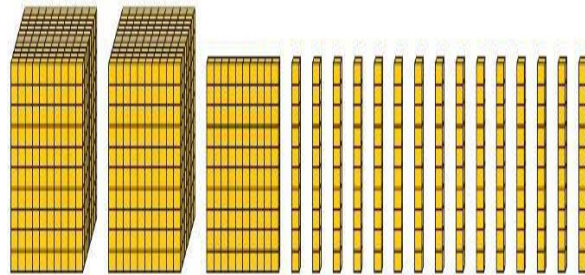
0	•	Tth	Hth
3	•	4	0
+	•	0	6
.	•	.	.

Year 5
Subtraction

Column subtraction with whole numbers

Use place value equipment to understand where exchanges are required.

$$2,250 - 1,070$$



Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required.

$$15,735 - 2,582 = 13,153$$

TTh	Th	H	T	O	
●	●●●●●	●●●●●	●●●●●	●●●●●	TTh Th H T O 1 5 7 3 5
		●●	●●●●●	●●●●●	- 2 5 8 2
					3

Now subtract the 10s. Exchange 1 hundred for 10 tens.

TTh	Th	H	T	O	
●	●●●●●	●●●●●	●●●●●	●●●●●	TTh Th H T O 1 5 7 3 5
		●●	●●●●●	●●●●●	- 2 5 8 2
			●●●●●	●●●●●	5 3


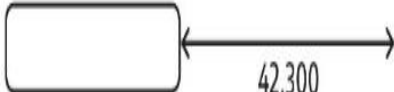


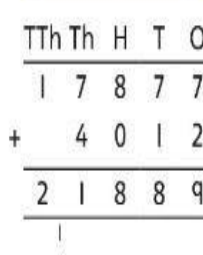
Subtract the 100s, 1,000s and 10,000s.

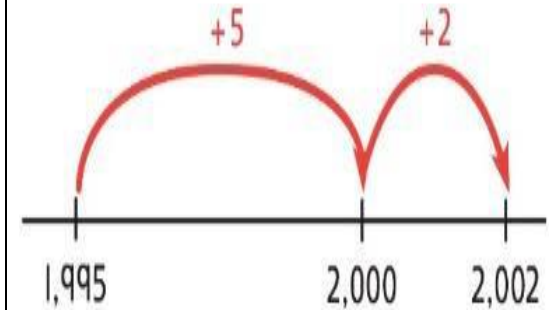
TTh	Th	H	T	O	
●	●●●●●	●●●●●	●●●●●	●●●●●	TTh Th H T O 1 5 7 3 5
		●●	●●●●●	●●●●●	- 2 5 8 2
			●●●●●	●●●●●	1 3 1 5 3

Use column subtraction methods with exchange where required.

	TTh	Th	H	T	O
	5	11	0	9	7
-	1	8	5	3	4
	4	3	5	6	3

$$62,097 - 18,534 = 43,563$$

<p>Checking strategies and representing subtractions</p>		<p>Bar models represent subtractions in problem contexts, including 'find the difference'.</p> <p>Athletics Stadium </p> <p>Hockey Centre </p> <p>Velodrome </p>	<p>Children can explain the mistake made when the columns have not been ordered correctly.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="1637 400 1883 727"> <p style="border: 1px solid cyan; border-radius: 10px; padding: 2px; display: inline-block;">Bella's working</p>  </div> <div data-bbox="1951 400 2152 727"> <p style="border: 1px solid green; border-radius: 10px; padding: 2px; display: inline-block;">Correct method</p>  </div> </div> <p>Use approximation to check calculations. I calculated $18,000 + 4,000$ mentally to check my subtraction.</p>
<p>Choosing efficient methods</p>			<p>To subtract two large numbers that are close, children find the difference by counting on. $2,002 - 1,995 = ?$</p>



Use addition to check subtractions.
*I calculated $7,546 - 2,355 = 5,191$.
 I will check using the inverse.*

Subtracting decimals

Explore complements to a whole number by working in the context of length.



$$1 \text{ m} - \boxed{} \text{ m} = \boxed{} \text{ m}$$

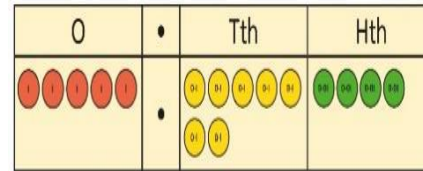
Use a place value grid to represent the stages of column subtraction, including exchanges where required.

$$5.74 - 2.25 = ?$$

Use column subtraction, with an understanding of place value, including subtracting numbers with different numbers of decimal places.

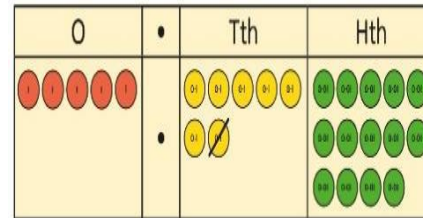
$$3.921 - 3.75 = ?$$

$$1 - 0.49 = ?$$



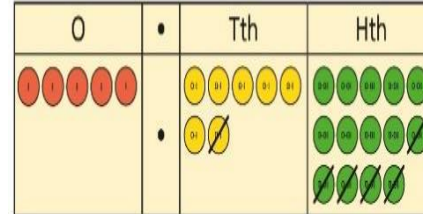
$$\begin{array}{r} 0 \cdot \text{Tth Hth} \\ 5 \cdot 7 \ 4 \\ - 2 \cdot 2 \ 5 \\ \hline \cdot \end{array}$$

Exchange 1 tenth for 10 hundredths.



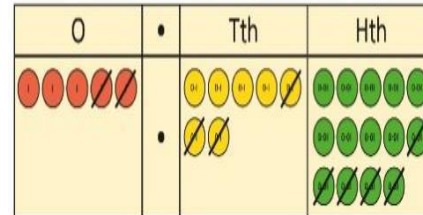
$$\begin{array}{r} 0 \cdot \text{Tth Hth} \\ 5 \cdot \overset{6}{7} \overset{1}{4} \\ - 2 \cdot 2 \ 5 \\ \hline \cdot \end{array}$$

Now subtract the 5 hundredths.



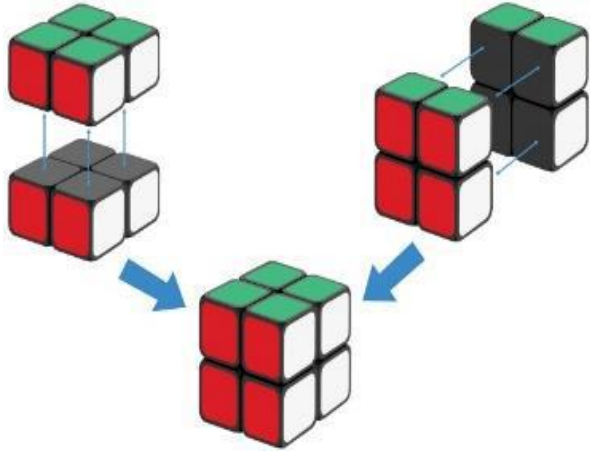
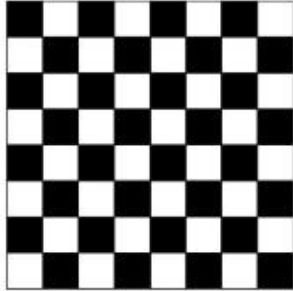
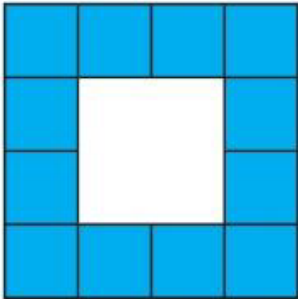
$$\begin{array}{r} 0 \cdot \text{Tth Hth} \\ 5 \cdot \overset{6}{7} \overset{1}{4} \\ - 2 \cdot 2 \ 5 \\ \hline \cdot \ 9 \end{array}$$

Now subtract the 2 tenths, then the 2 ones.





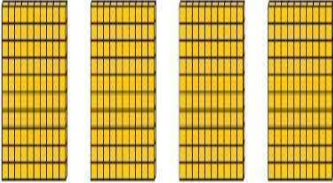
$$\begin{array}{r} 0 \cdot \text{Tth Hth} \\ 5 \cdot \overset{6}{7} \overset{1}{4} \\ - 2 \cdot 2 \ 5 \\ \hline 3 \cdot 4 \ 9 \end{array}$$

$$\begin{array}{r} 0 \cdot \text{Tth Hth Thth} \\ \hline 3 \cdot 9 \ 2 \ 1 \\ - 3 \cdot 7 \ 5 \ 0 \\ \hline \cdot \end{array}$$

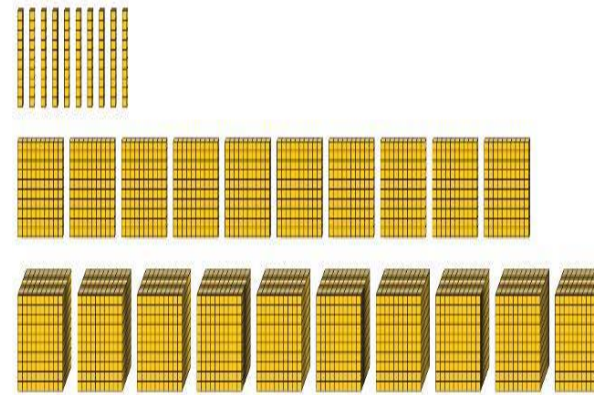
<p>Year 5 Multiplication</p>			
<p>Understanding factors</p>	<p>Use cubes or counters to explore the meaning of 'square numbers'. <i>25 is a square number because it is made from 5 rows of 5.</i> Use cubes to explore cube numbers.</p>  <p><i>8 is a cube number.</i></p>	<p>Use images to explore examples and non-examples of square numbers.</p>  <p>$8 \times 8 = 64$ $8 \times 2 = 64$</p>  <p><i>12 is not a square number, because you cannot multiply a whole number by itself to make 12.</i></p>	<p>Understand the pattern of square numbers in the multiplication tables. Use a multiplication grid to circle each square number. Can children spot a pattern?</p>

Multiplying by 10, 100 and 1,000

Use place value equipment to multiply by 10, 100 and 1,000 by unitising.

$4 \times 1 = 4 \text{ ones} = 4$	
$4 \times 10 = 4 \text{ tens} = 40$	
$4 \times 100 = 4 \text{ hundreds} = 400$	

Understand the effect of repeated multiplication by 10.



Understand how exchange relates to the digits when multiplying by 10, 100 and 1,000.

H	T	O
	1	7

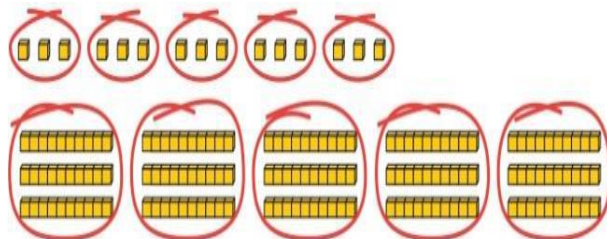
$$17 \times 10 = 170$$

$$17 \times 100 = 17 \times 10 \times 10 = 1,700$$

$$17 \times 1,000 = 17 \times 10 \times 10 \times 10 = 17,000$$

Multiplying by multiples of 10, 100 and 1,000

Use place value equipment to explore multiplying by unitising.



Use place value equipment to represent how to multiply by multiples of 10, 100 and 1,000.

Use known facts and unitising to multiply.

$$5 \times 4 = 20$$

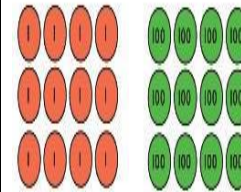
$$5 \times 40 = 200$$

$$5 \times 400 = 2,000$$

$$5 \times 4,000 = 20,000$$

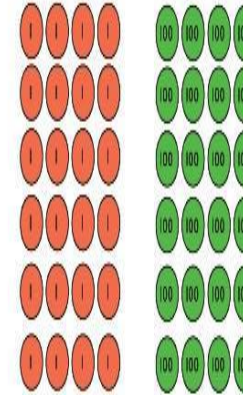
$$5,000 \times 4 = 20,000$$

5 groups of 3 ones is 15 ones.
 5 groups of 3 tens is 15 tens.
 So, I know that 5 groups of 3 thousand would be 15 thousand.



$$4 \times 3 = 12$$

$$4 \times 300 = 1,200$$



$$6 \times 4 = 24$$

$$6 \times 400 = 2,400$$

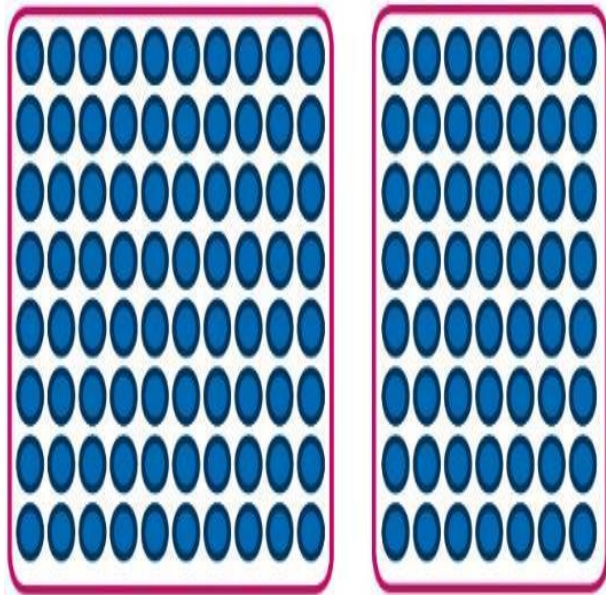
Multiplying up to 4-digit numbers by a single digit

Explore how to use partitioning to multiply efficiently.
 $8 \times 17 = ?$

Represent multiplications using place value equipment and add the 1s, then 10s, then 100s, then 1,000s.

	100	60	3
5	$100 \times 5 = 500$	$60 \times 5 = 300$	$3 \times 5 = 15$

Use a column multiplication, including any required exchanges.



$$8 \times 10 = 80$$

$$8 \times 7 = 56$$

$$80 + 56 = 136$$

So, $8 \times 17 = 136$

	H	T	O
(100)		10 10 10 10 10 10	1 1 1
(100)		10 10 10 10 10 10	1 1 1
(100)		10 10 10 10 10 10	1 1 1
(100)		10 10 10 10 10 10	1 1 1
(100)		10 10 10 10 10 10	1 1 1

$$\begin{array}{r}
 136 \\
 \times 6 \\
 \hline
 816 \\
 \hline
 23
 \end{array}$$

Multiplying 2-digit numbers by 2-digit numbers

Partition one number into 10s and 1s, then add the parts.

$$23 \times 15 = ?$$

Use an area model and add the parts.

$$28 \times 15 = ?$$

Use column multiplication, ensuring understanding of place value at each stage.



$$10 \times 15 = 150$$



$$10 \times 15 = 150$$



$$3 \times 15 = 45$$

There are 345 bottles of milk in total.

$$23 \times 15 = 345$$

H T O	1 5 0
	1 5 0
+	4 5
	3 4 5

	20 m	8 m	H T O
	$20 \times 10 = 200 \text{ m}^2$		2 0 0
10 m	$8 \times 10 = 80 \text{ m}^2$		1 0 0
	$20 \times 5 = 100 \text{ m}^2$		8 0
5 m	$8 \times 5 = 40 \text{ m}^2$		+ 4 0
			4 2 0

$$28 \times 15 = 420$$

	3 4	
×	2 7	
	2 3 8	34 × 7
	2 3 8	
	2 3 8	

	3 4	
×	2 7	
	2 3 8	34 × 7
	6 8 0	
	6 8 0	34 × 20
	6 8 0	

$$\begin{array}{r}
 34 \\
 \times 27 \\
 \hline
 238 \\
 680 \\
 \hline
 918
 \end{array}$$

34×7
 34×20
 34×27

Multiplying up to 4-digits by 2-digits

Use the area model then add the parts

	100	40	3	
10				Th H T O
2				1 0 0 0

$$\begin{array}{r}
 143 \times 12 = 1,716 \\
 \text{There are 1,716 boxes of cereal in total.} \\
 143 \times 12 = 1,716
 \end{array}$$

$$\begin{array}{r}
 1000 \\
 400 \\
 200 \\
 80 \\
 30 \\
 + 6 \\
 \hline
 1716
 \end{array}$$

Use column multiplication, ensuring understanding of place value at each stage.

$$\begin{array}{r}
 143 \\
 \times 12 \\
 \hline
 286 \\
 1430 \\
 \hline
 1716
 \end{array}$$

143×2
 143×10
 143×12

Progress to include examples that require multiple exchanges as understanding, confidence and fluency build.

$$1,274 \times 32 = ?$$

First multiply 1,274 by 2.

$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \end{array} \quad 1,274 \times 2$$

Then multiply 1,274 by 30.

$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \quad 1,274 \times 2 \\ 3\ 8\ 2\ 2\ 0 \quad 1,274 \times 30 \\ \hline \end{array}$$

Finally, find the total.

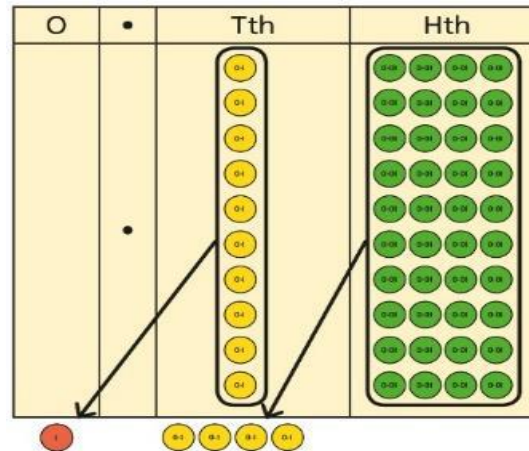
$$\begin{array}{r}
 1\ 2\ 7\ 4 \\
 \times \qquad\qquad\qquad 3\ 2 \\
 \hline
 2\ 5\ 4\ 8 \quad 1,274 \times 2 \\
 3\ 8\ 2\ 2\ 0 \quad 1,274 \times 30 \\
 \hline
 4\ 0\ 7\ 6\ 8 \quad 1,274 \times 32 \\
 \hline
 \end{array}$$

$$1,274 \times 32 = 40,768$$

Multiplying decimals by 10, 100 and 1,000

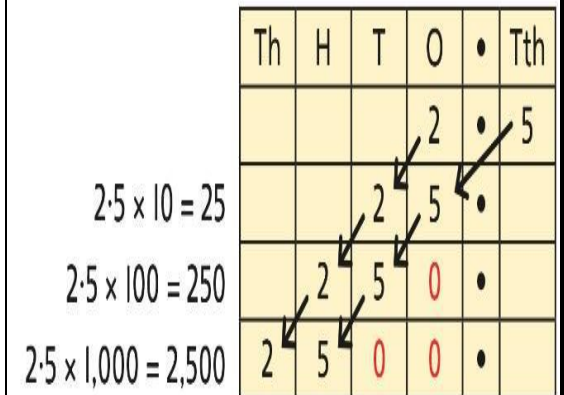
Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths.

Represent multiplication by 10 as exchange on a place value grid.



$$0.14 \times 10 = 1.4$$


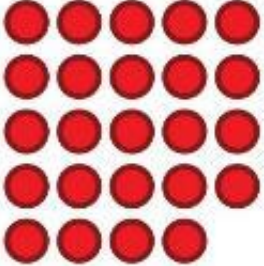
Understand how this exchange is represented on a place value chart.

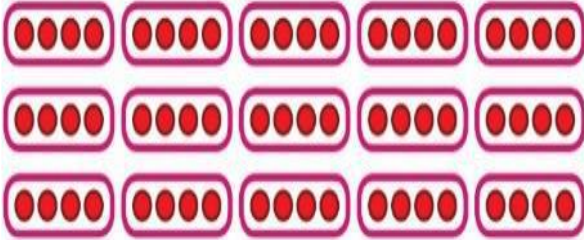
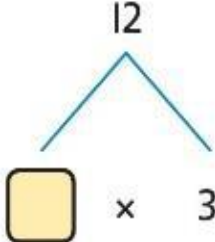


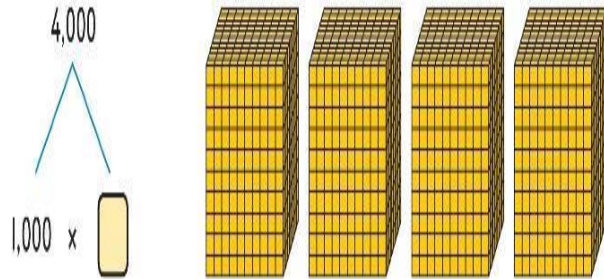
$$2.5 \times 10 = 25$$

$$2.5 \times 100 = 250$$

$$2.5 \times 1,000 = 2,500$$

<p>Year 5 Division</p>			
<p>Understanding factors and prime numbers</p>	<p>Use equipment to explore the factors of a given number.</p>  <p>$24 \div 3 = 8$ $24 \div 8 = 3$ <i>8 and 3 are factors of 24 because they divide 24 exactly.</i></p> <p>$24 \div 5 = 4$ remainder 4.</p>  <p><i>5 is not a factor of 24 because there is a remainder.</i></p>	<p>Understand that prime numbers are numbers with exactly two factors.</p> <p>$13 \div 1 = 13$ $13 \div 2 = 6 \text{ r } 1$ $13 \div 4 = 4 \text{ r } 1$</p> <p><i>1 and 13 are the only factors of 13. 13 is a prime number.</i></p>	<p>Understand how to recognise prime and composite numbers.</p> <p><i>I know that 31 is a prime number because it can be divided by only 1 and itself without leaving a remainder.</i></p> <p><i>I know that 33 is not a prime number as it can be divided by 1, 3, 11 and 33.</i></p> <p><i>I know that 1 is not a prime number, as it has only 1 factor.</i></p>

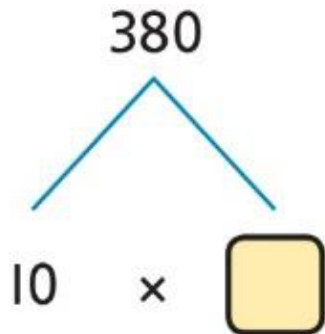
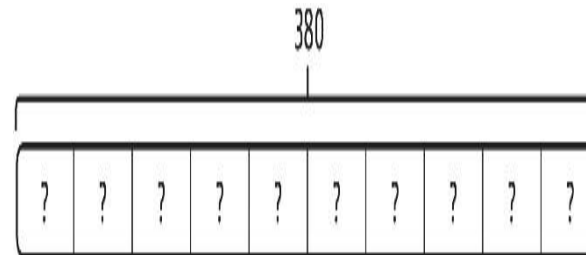
<p>Understanding inverse operations and the link with multiplication, grouping and sharing</p>	<p>Use equipment to group and share and to explore the calculations that are present.</p> <p><i>I have 28 counters.</i></p> <p><i>I made 7 groups of 4. There are 28 in total.</i></p> <p><i>I have 28 in total. I shared them equally into 7 groups. There are 4 in each group.</i></p> <p><i>I have 28 in total. I made groups of 4. There are 7 equal groups.</i></p>	<p>Represent multiplicative relationships and explore the families of division facts.</p>  <p>$60 \div 4 = 15$</p> <p>$60 \div 15 = 4$</p>	<p>Represent the different multiplicative relationships to solve problems requiring inverse operations.</p> <p>$12 \div 3 = \square$</p> <p>$12 \div \square = 3$</p> <p>$\square \times 3 = 12$</p> <p>$\square \div 3 = 12$</p>  <p>Understand missing number problems for division calculations and know how to solve them using inverse operations.</p> <p>$22 \div ? = 2$</p> <p>$22 \div 2 = ?$</p> <p>$? \div 2 = 22$</p> <p>$? \div 22 = 2$</p>
<p>Dividing whole numbers by 10, 100 and 1,000</p>	<p>Use place value equipment to support unitising for division.</p> <p>$4,000 \div 1,000$</p>	<p>Use a bar model to support dividing by unitising.</p> <p>$380 \div 10 = 38$</p>	<p>Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.</p>



4,000 is 4 thousands.

$$4 \times 1,000 = 4,000$$

So, $4,000 \div 1,000 = 4$



380 is 38 tens.

$$38 \times 10 = 380$$

$$10 \times 38 = 380$$

So, $380 \div 10 = 38$

Th	H	T	O
3	2	0	0

$$3,200 \div 100 = ?$$

3,200 is 3 thousands and 2 hundreds.

$$200 \div 100 = 2$$

$$3,000 \div 100 = 30$$

$$3,200 \div 100 = 32$$

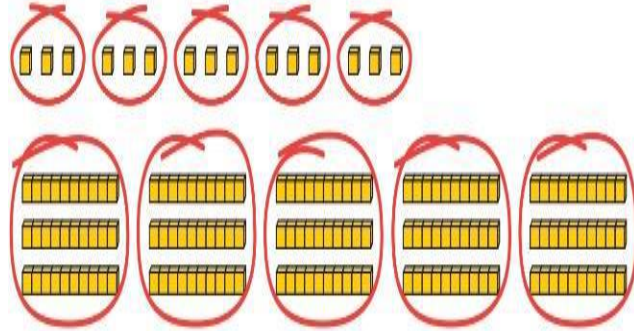
So, the digits will move two places to the right.

Dividing by multiples of 10, 100 and 1,000

Use place value equipment to represent known facts and unitising.

Represent related facts with place value equipment when dividing by unitising.

Reason from known facts, based on understanding of unitising. Use knowledge of the inverse relationship to check.

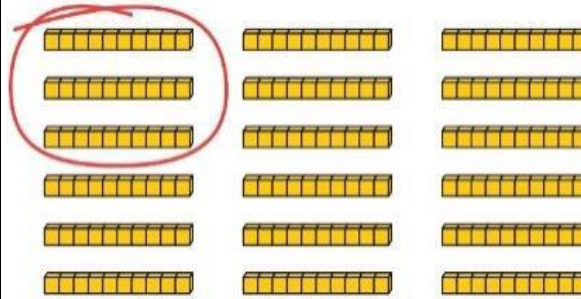


15 ones put into groups of 3 ones. There are 5 groups.

$$15 \div 3 = 5$$

15 tens put into groups of 3 tens. There are 5 groups.

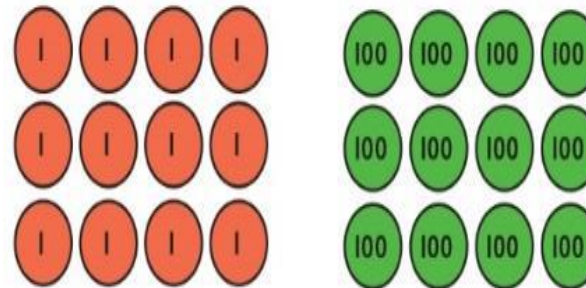
$$150 \div 30 = 5$$



180 is 18 tens.

18 tens divided into groups of 3 tens. There are 6 groups.

$$180 \div 30 = 6$$



12 ones divided into groups of 4. There are 3 groups.

$$3,000 \div 5 = 600$$

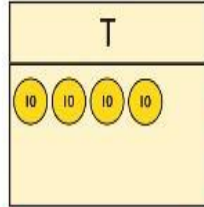
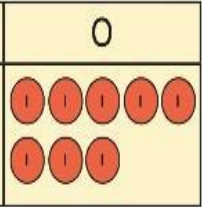
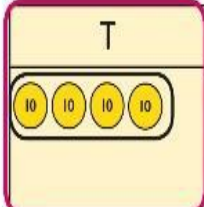
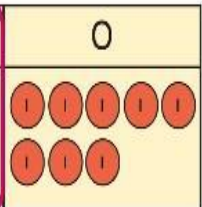
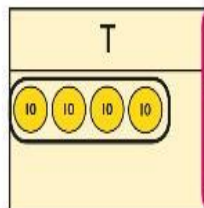
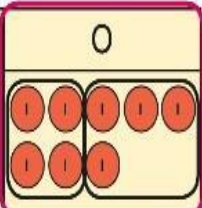
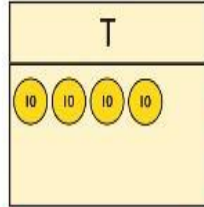
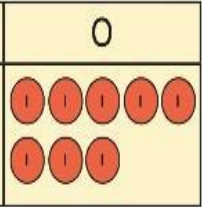
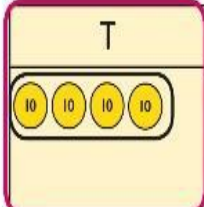
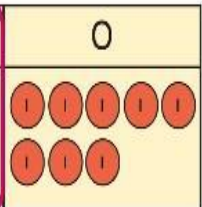
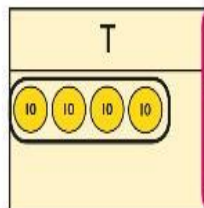
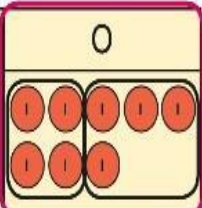
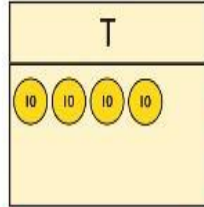
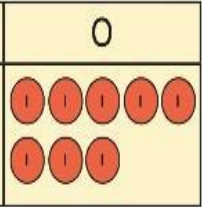
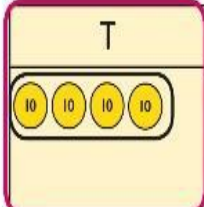
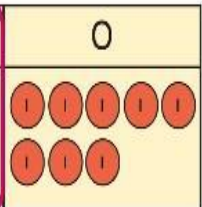
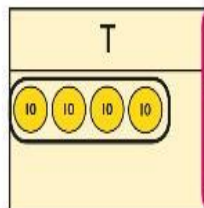
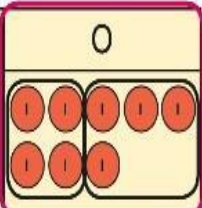
$$3,000 \div 50 = 60$$

$$3,000 \div 500 = 6$$







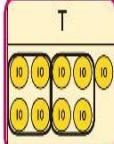

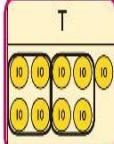

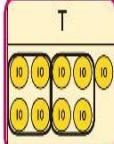

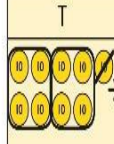
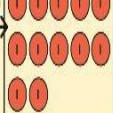
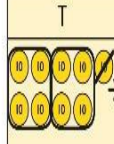
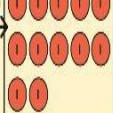
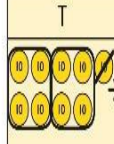
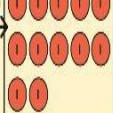
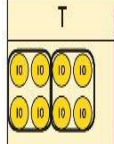

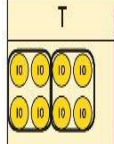

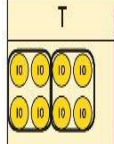

$$5 \times 600 = 3,000$$

$$50 \times 60 = 3,000$$

$$500 \times 6 = 3,000$$

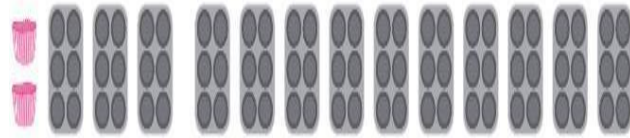
		<p>12 hundreds divided into groups of 4 hundreds. There are 3 groups. $1200 \div 400 = 3$</p>													
<p>Dividing up to four digits by a single digit using short division</p>	<p>Explore grouping using place value equipment. $268 \div 2 = ?$</p> <p>There is 1 group of 2 hundreds. There are 3 groups of 2 tens. There are 4 groups of 2 ones.</p> <p>$264 \div 2 = 134$</p>	<p>Use place value equipment on a place value grid alongside short division. The model uses grouping. A sharing model can also be used, although the model would need adapting.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> $\begin{array}{r} 4 \overline{) 48} \\ \underline{4} \\ 8 \end{array}$ $\begin{array}{r} 1 \\ 4 \overline{) 48} \\ \underline{4} \\ 8 \end{array}$ $\begin{array}{r} 12 \\ 4 \overline{) 48} \\ \underline{4} \\ 8 \end{array}$ </div> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">T</td> <td style="padding: 5px;">O</td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">T</td> <td style="padding: 5px;">O</td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">T</td> <td style="padding: 5px;">O</td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> </table> </div> <p>Lay out the problem as a short division.</p>	T	O			T	O			T	O			<p>Use short division for up to 4-digit numbers divided by a single digit.</p> <div style="text-align: center;"> $\begin{array}{r} 0556 \\ 7 \overline{) 3892} \\ \underline{3} \\ 8 \\ \underline{7} \\ 9 \\ \underline{7} \\ 2 \end{array}$ </div> <p>$3,892 \div 7 = 556$</p> <p>Use multiplication to check.</p> <p>$556 \times 7 = ?$</p> <p>$6 \times 7 = 42$ $50 \times 7 = 350$ $500 \times 7 = 3500$</p> <p>$3,500 + 350 + 42 = 3,892$</p>
T	O														
															
T	O														
															
T	O														
															

There is 1 group of 4 in 4 tens.
 There are 2 groups of 4 in 8 ones.
 Work with divisions that require exchange.

$4 \overline{) 92}$	<table border="1" style="border-collapse: collapse; width: 100px; height: 60px;"> <tr> <td style="text-align: center; padding: 5px;">T</td> <td style="text-align: center; padding: 5px;">O</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	T	O			First, lay out the problem.
T	O					
						
$4 \overline{) 9} 2$	<table border="1" style="border-collapse: collapse; width: 100px; height: 60px;"> <tr> <td style="text-align: center; padding: 5px;">T</td> <td style="text-align: center; padding: 5px;">O</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	T	O			How many groups of 4 go into 9 tens? 2 groups of 4 tens with 1 ten left over.
T	O					
						
$4 \overline{) 9} 2$	<table border="1" style="border-collapse: collapse; width: 100px; height: 60px;"> <tr> <td style="text-align: center; padding: 5px;">T</td> <td style="text-align: center; padding: 5px;">O</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	T	O			Exchange the 1 ten left over for 10 ones. We now have 12 ones.
T	O					
						
$4 \overline{) 9} 2$	<table border="1" style="border-collapse: collapse; width: 100px; height: 60px;"> <tr> <td style="text-align: center; padding: 5px;">T</td> <td style="text-align: center; padding: 5px;">O</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	T	O			How many groups of 4 go into 12 ones? 3 groups of 4 ones.
T	O					
						

Understanding remainders

Understand remainders using concrete versions of a problem.
80 cakes divided into trays of 6.



80 cakes in total. They make 13 groups of 6, with 2 remaining.

Use short division and understand remainders as the last remaining 1s.

6 $\overline{)80}$

T	O
10 10 10 10	
10 10	

Lay out the problem as short division.

6 $\overline{)8}20$

T	O
10 10 10	
10 10	

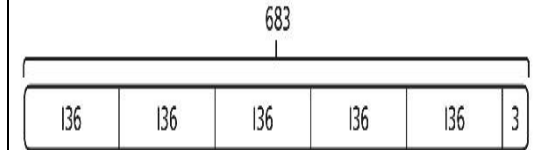
How many groups of 6 go into 8 tens?
 There is 1 group of 6 tens.
 There are 2 tens remaining.

6 $\overline{)8}20$

T	O
10 10 10	1 1 1 1 1 1
10 10	1 1 1 1 1 1
	1 1 1 1 1 1

How many groups of 6 go into 20 ones?
 There are 3 groups of 6 ones.
 There are 2 ones remaining.

In problem solving contexts, represent divisions including remainders with a bar model.



$$683 = 136 \times 5 + 3$$

$$683 \div 5 = 136 \text{ r } 3$$

Dividing decimals by 10, 100 and 1,000

Understand division by 10 using exchange.

2 ones are 20 tenths.

20 tenths divided by 10 is 2 tenths.

Represent division using exchange on a place value grid.

0	•	Tth	Hth
1	•	01 02 03 04 05	

0	•	Tth	Hth
1	•	01 02 03 04 05	
	•	01 02 03 04 05	01 02 03 04 05

0	•	Tth	Hth
	•	01 02 03 04 05	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

Understand the movement of digits on a place value grid.

0	•	Tth	Hth	Thth
0	•	8	5	
0	•	0	8	5

$0.85 \div 10 = 0.085$

0	•	Tth	Hth	Thth
8	•	5		
0	•	0	8	5

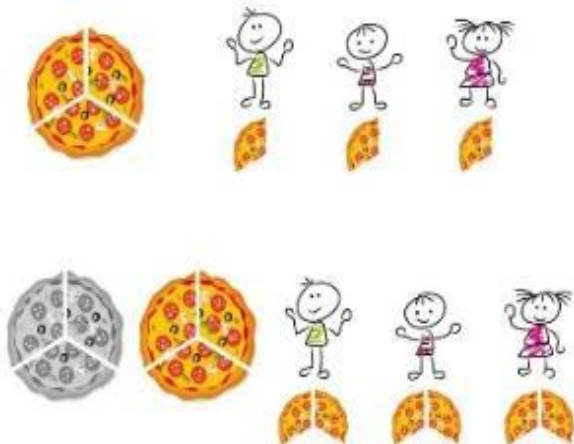
$8.5 \div 100 = 0.085$

*15 is 1 one and 5 tenths.
This is equivalent to 10 tenths and 50 hundredths.
10 tenths divided by 10 is 1 tenth.
50 hundredths divided by 10 is 5 hundredths.
15 divided by 10 is 1 tenth and 5 hundredths.
 $15 \div 10 = 0.15$*

Understanding the relationship between fractions and division

Use sharing to explore the link between fractions and division.

*1 whole shared between 3 people.
Each person receives one-third.*



Use a bar model and other fraction representations to show the link between fractions and division.



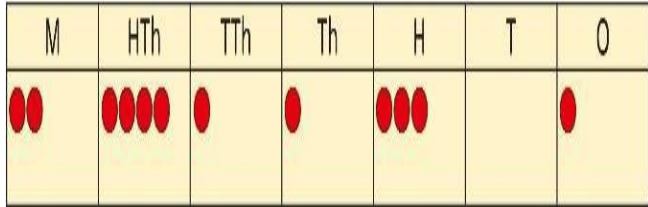
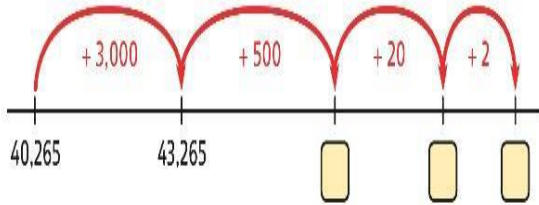
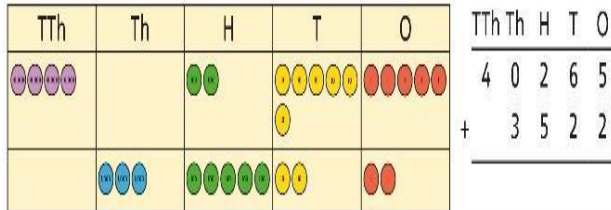
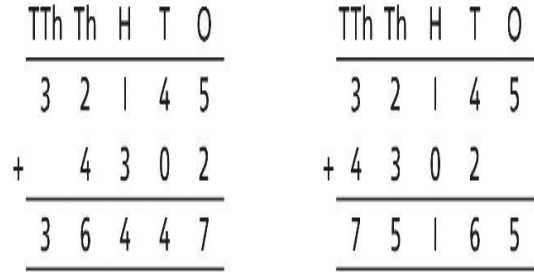
$$1 \div 3 = \frac{1}{3}$$

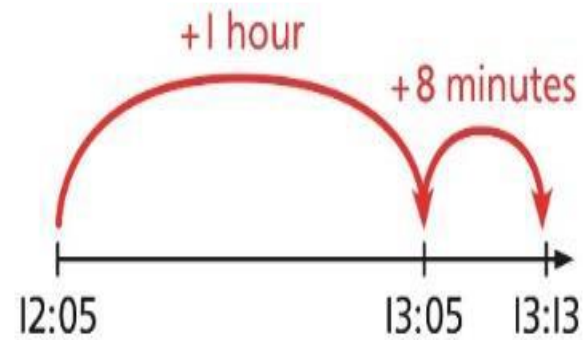
Use the link between division and fractions to calculate divisions.

$$5 \div 4 = \frac{5}{4} = 1 \frac{1}{4}$$

$$11 \div 4 = \frac{11}{4} = 2 \frac{3}{4}$$

Year 6

	Concrete	Pictorial	Abstract
Year 6 Addition			
Comparing and selecting efficient methods	<p>Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.</p> 	<p>Discuss similarities and differences between methods, and choose efficient methods based on the specific calculation. Compare written and mental methods alongside place value representations.</p>  	<p>Use column addition where mental methods are not efficient. Recognise common errors with column addition.</p> <p>$32,145 + 4,302 = ?$</p>  <p>Which method has been completed accurately?</p> <p>What mistake has been made?</p>

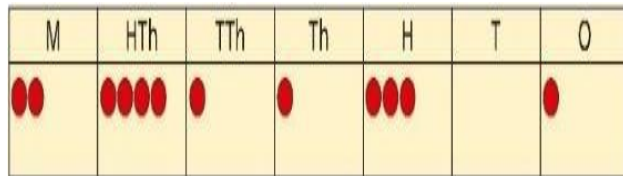


Column methods are also used for decimal additions where mental methods are not efficient.

	H	T	O	·	Tth	Hth
	1	4	0	·	0	9
+		4	9	·	8	9
	1	8	9	·	9	8
						1

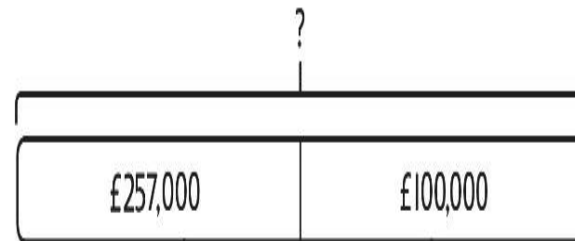
Selecting mental methods for larger numbers where appropriate

Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.



$2,411,301 + 500,000 = ?$
 This would be 5 more counters in the HTh place.
 So, the total is 2,911,301.
 $2,411,301 + 500,000 = 2,911,301$

Use a bar model to support thinking in addition problems.
 $257,000 + 99,000 = ?$



I added 100 thousands then subtracted 1 thousand.

Use place value and unitising to support mental calculations with larger numbers.

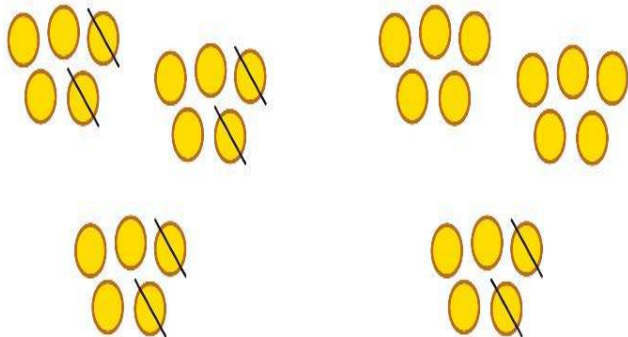
$195,000 + 6,000 = ?$
 $195 + 5 + 1 = 201$
 195 thousands + 6 thousands = 201 thousands
 So, $195,000 + 6,000 = 201,000$

257 thousands + 100 thousands = 357 thousands
 257,000 + 100,000 = 357,000
 357,000 - 1,000 = 356,000
 So, 257,000 + 99,000 = 356,000

Understanding order of operations in calculations

Use equipment to model different interpretations of a calculation with more than one operation. Explore different results.

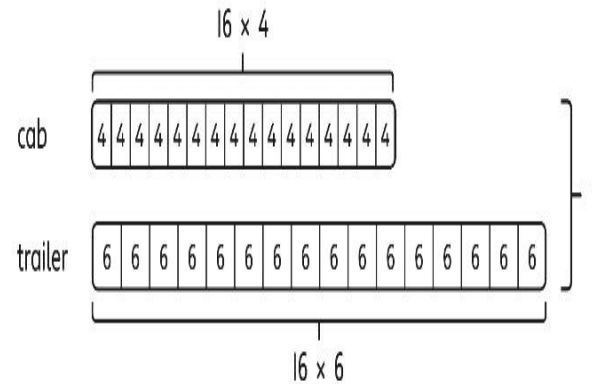
$3 \times 5 - 2 = ?$



$$\begin{array}{c} 3 \times 5 - 2 \\ \downarrow \quad \downarrow \\ 3 \times 3 = 9 \end{array}$$

$$\begin{array}{c} 3 \times 5 - 2 \\ \downarrow \quad \downarrow \\ 15 - 2 = 13 \end{array}$$

Model calculations using a bar model to demonstrate the correct order of operations in multi-step calculations.



This can be written as: $16 \times 4 + 16 \times 6$

$$\begin{array}{c} 16 \times 4 + 16 \times 6 \\ 64 + 96 = 160 \end{array}$$

Understand the correct order of operations in calculations without brackets.

Understand how brackets affect the order of operations in a calculation.

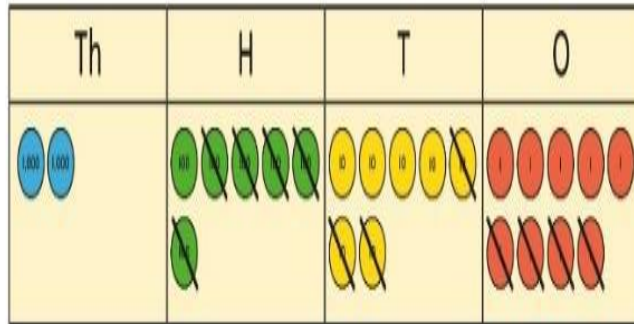
$$\begin{array}{l} 4 + 6 \times 16 \\ 4 + 96 = 100 \end{array}$$

$$\begin{array}{l} (4 + 6) \times 16 \\ 10 \times 16 = 160 \end{array}$$

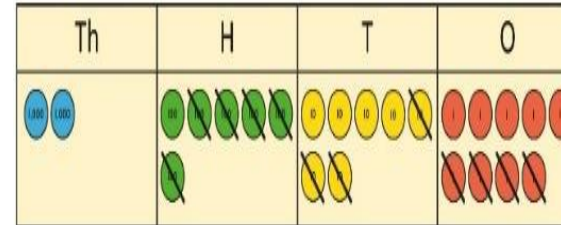
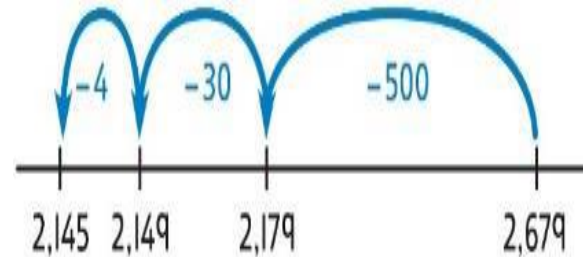
Year 6
Subtraction

Comparing
and selecting
efficient
methods

Use counters on a place value grid to represent subtractions of larger numbers.

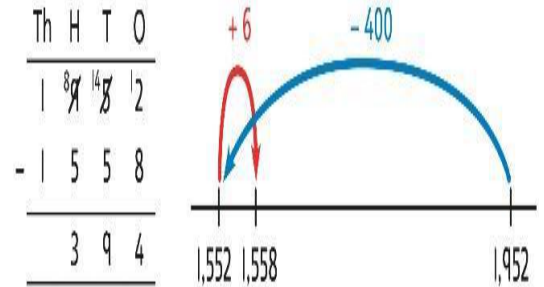


Compare subtraction methods alongside place value representations.



$$\begin{array}{r}
 \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\
 \hline
 2 \quad 6 \quad 7 \quad 9 \\
 - \quad \quad 5 \quad 3 \quad 4 \\
 \hline
 2 \quad 1 \quad 4 \quad 5
 \end{array}$$

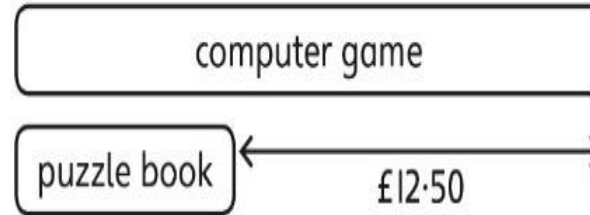
Compare and select methods.
Use column subtraction when mental methods are not efficient.
Use two different methods for one calculation as a checking strategy.



Use column subtraction for decimal problems, including in the context of measure.

H	T	O	Tth	Hth
3	0	9	·	6
-	2	0	·	4
<hr/>				
1	0	3	·	2

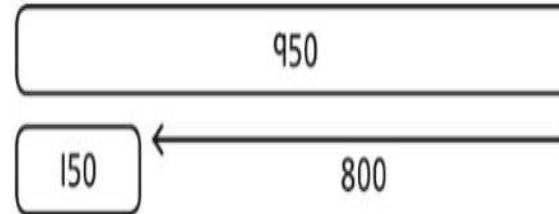
Use a bar model to represent calculations, including 'find the difference' with two bars as comparison.



Use a bar model to show how unitising can support mental calculations.

$$950,000 - 150,000$$

That is 950 thousands - 150 thousands



So, the difference is 800 thousands.

$$950,000 - 150,000 = 800,000$$

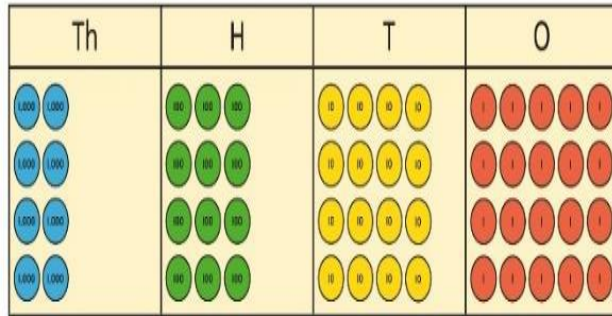
Subtract efficiently from powers of 10.
 $10,000 - 500 = ?$

Subtracting mentally with larger numbers

Year 6
Multiplication

Multiplying up to a 4-digit number by a single digit number

Use equipment to explore multiplications.



4 groups of 2,345

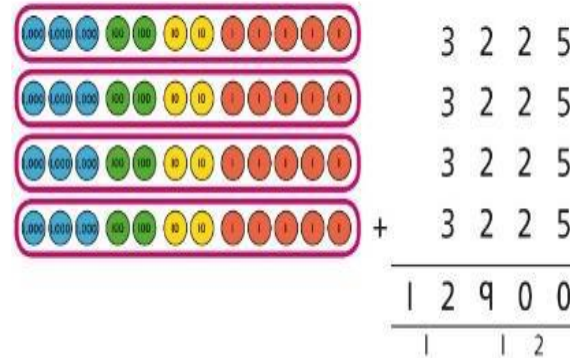
This is a multiplication:

$$4 \times 2,345$$

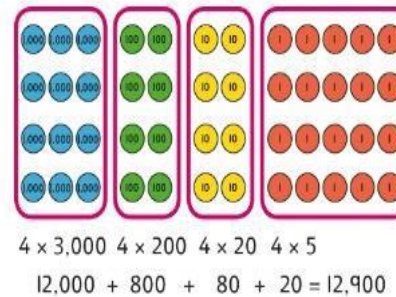
$$2,345 \times 4$$

Use place value equipment to compare methods.

Method 1

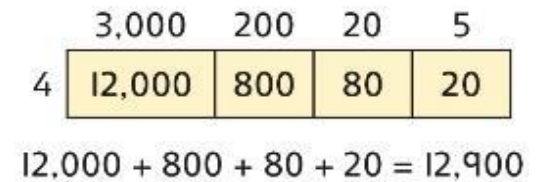


Method 2

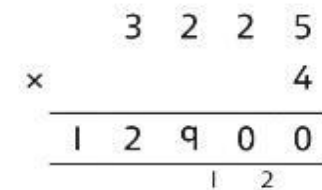


Understand area model and short multiplication. Compare and select appropriate methods for specific multiplications.

Method 3



Method 4

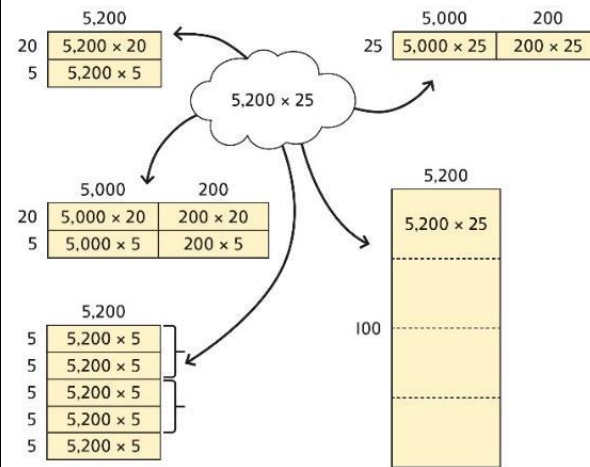


Multiplying up to a 4-digit number by a 2-digit number

Use an area model alongside formal written method for multiplication.

Use compact column multiplication with understanding of place value at all stages.

$$5 \times 5 \times 5 = 5^3 = 25 \times 5 = 125$$



Represent and compare methods using a bar model.

Use factors to calculate efficiently.

$$15 \times 16$$

$$= 3 \times 5 \times 2 \times 8$$

$$= 3 \times 8 \times 2 \times 5$$

$$= 24 \times 10$$

$$= 240$$

Multiplying by 10, 100 and 1,000

Use place value equipment to explore exchange in decimal multiplication

Understand how the exchange affects decimal numbers on a place value grid.

Use knowledge of multiplying by 10, 100 and 1,000 to multiply by multiples of 10, 100 and 1,000.

$$8 \times 100 = 800$$

$$8 \times 300 = 800 \times 3$$

$$= 2,400$$

$$2.5 \times 10 = 25$$

$$2.5 \times 20 = 2.5 \times 10 \times 2$$

$$= 50$$

T	O	•	Tth
			3 3 3

Represent 0.3.

T	O	•	Tth
			30 30 30

Multiply by 10.

T	O	•	Tth
1			0 0 0
1			0 0 0
1			0 0 0

Exchange each group of ten tenths.

T	O	•	Tth
	3		0 0 0
	3		0 0 0
	3		0 0 0

T	O	•	Tth
			3

T	O	•	Tth
	3		3

T	O	•	Tth
	3		

$$0.3 \times 10 = 3$$

$$0.3 \times 10 = ?$$

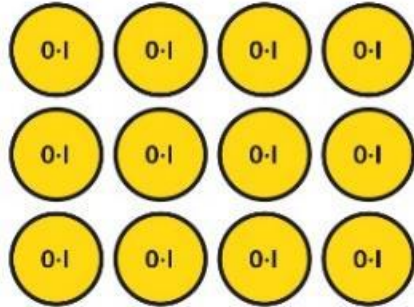
0.3 is 3 tenths.

10 × 3 tenths are 30 tenths.

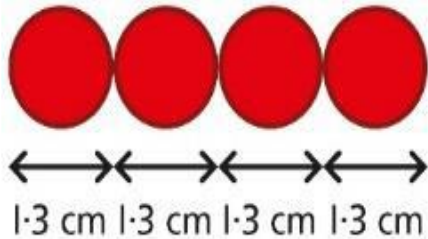
30 tenths are equivalent to 3 ones.

Multiplying decimals

Explore decimal multiplications using place value equipment and in the context of measures.



3 groups of 4 tenths is 12 tenths.
4 groups of 3 tenths is 12 tenths.



$$4 \times 1 \text{ cm} = 4 \text{ cm}$$

$$4 \times 0.3 \text{ cm} = 1.2 \text{ cm}$$

$$4 \times 1.3 = 4 + 1.2 = 5.2 \text{ cm}$$

Represent calculations on a place value grid.

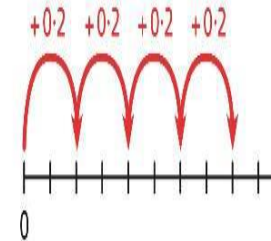
$$3 \times 3 = 9$$

$$3 \times 0.3 = 0.9$$

T	O	•	Tth

Understand the link between multiplying decimals and repeated addition.

T	O	•	Tth



Use known facts to multiply decimals.

$$4 \times 3 = 12$$

$$4 \times 0.3 = 1.2$$

$$4 \times 0.03 = 0.12$$

$$20 \times 5 = 100$$

$$20 \times 0.5 = 10$$

$$20 \times 0.05 = 1$$

Find families of facts from a known multiplication.

I know that $18 \times 4 = 72$.
This can help me work out:

$$1.8 \times 4 = ?$$

$$18 \times 0.4 = ?$$

$$180 \times 0.4 = ?$$

$$18 \times 0.04 = ?$$

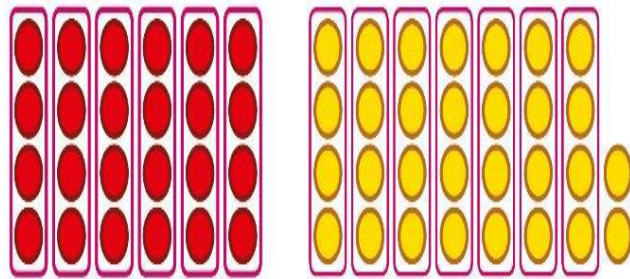
Use a place value grid to understand the effects of multiplying decimals.

	H	T	O	•	Tth	Hth
2×3			6	•		
0.2×3			0	•	6	
0.02×3				•		

Year 6
Division

Understanding
factors

Use equipment to explore different factors of a number.

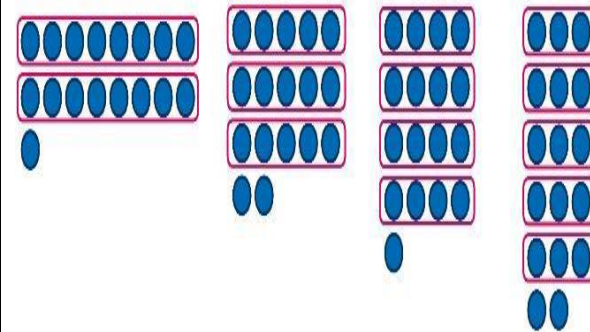


$24 \div 4 = 6$

$30 \div 4 = 7 \text{ remainder } 2$

4 is a factor of 24 but is not a factor of 30.

Recognise prime numbers as numbers having exactly two factors. Understand the link with division and remainders.



$17 \div 2 = 8 \text{ r}1$

$17 \div 3 = 5 \text{ r}2$

$17 \div 4 = 4 \text{ r}1$

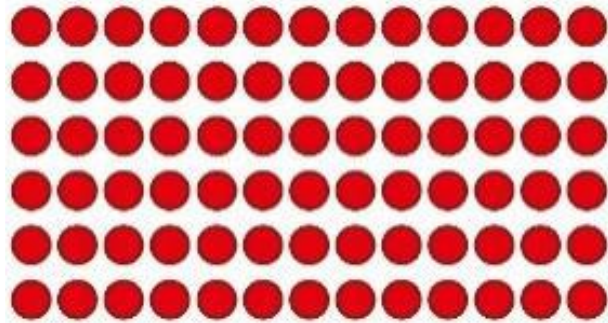
$17 \div 5 = 3 \text{ r}2$

Recognise and know primes up to 100. Understand that 2 is the only even prime, and that 1 is not a prime number.

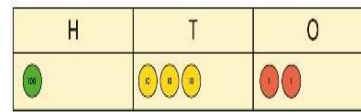
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Dividing by a single digit

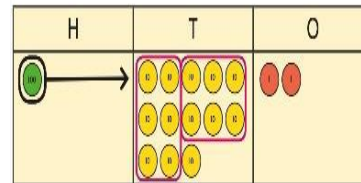
Use equipment to make groups from a total.



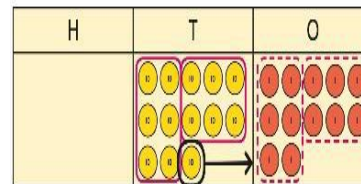
There are 78 in total.
 There are 6 groups of 13.
 There are 13 groups of 6.



How many groups of 6 are in 100?
 $6 \overline{) 100}$



How many groups of 6 are in 13 tens?
 $6 \overline{) 130}$



How many groups of 6 are in 12 ones?
 $6 \overline{) 122}$

Use short division to divide by a single digit.

$$\begin{array}{r} 0 \\ 6 \overline{) 132} \end{array}$$

$$\begin{array}{r} 02 \\ 6 \overline{) 132} \end{array}$$

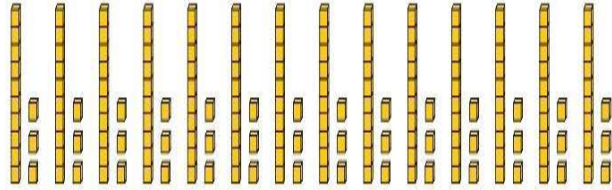
$$\begin{array}{r} 022 \\ 6 \overline{) 132} \end{array}$$

Use an area model to link multiplication and division.

			<p style="text-align: center;">?</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">132</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">10</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">60</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">10</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">60</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">1</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">6</td> </tr> </table> <p>$6 \times ? = 132$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">20</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">120</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">2</td> <td style="border: 1px solid black; padding: 5px; margin: 0 10px;">12</td> </tr> </table> <p>$132 = 120 + 12$</p> <p>$132 \div 6 = 20 + 2 = 22$</p>	6	132	6	10	60	10	60	1	1	6	6	6	20	120	2	12
6	132	6	10	60	10	60	1	1	6	6									
6	20	120	2	12															
<p>Dividing by a 2-digit number using factors</p>	<p>Understand that division by factors can be used when dividing by a number that is not prime.</p>	<p>Use factors and repeated division.</p> <p>$1,260 \div 14 = ?$</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 10px; text-align: center;">1,260</div> <div style="border: 1px solid black; width: 80px; height: 80px; margin: 0 10px;"></div> <div style="border: 1px solid black; width: 80px; height: 80px; margin: 0 10px; display: flex; flex-direction: column;"> <div style="border-bottom: 1px solid black; height: 40px;"></div> <div style="border-bottom: 1px solid black; height: 40px;"></div> </div> </div> <p>$1,260 \div 2 = 630$ $630 \div 7 = 90$ $1,260 \div 14 = 90$</p>	<p>Use factors and repeated division where appropriate.</p> <p>$2,100 \div 12 = ?$</p> <p>$2,100 \rightarrow \boxed{\div 2} \rightarrow \boxed{\div 6} \rightarrow$</p> <p>$2,100 \rightarrow \boxed{\div 6} \rightarrow \boxed{\div 2} \rightarrow$</p> <p>$2,100 \rightarrow \boxed{\div 3} \rightarrow \boxed{\div 4} \rightarrow$</p> <p>$2,100 \rightarrow \boxed{\div 4} \rightarrow \boxed{\div 3} \rightarrow$</p> <p>$2,100 \rightarrow \boxed{\div 3} \rightarrow \boxed{\div 2} \rightarrow \boxed{\div 2} \rightarrow$</p>																

Dividing by a 2-digit number using long division

Use equipment to build numbers from groups.

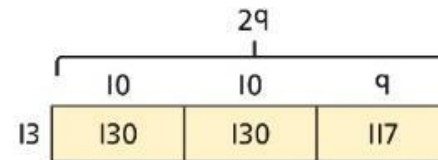
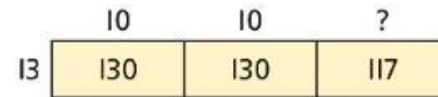
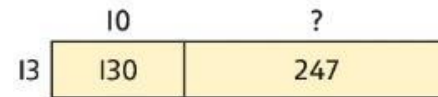
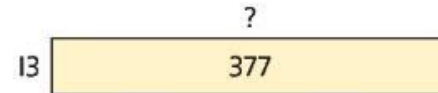


182 divided into groups of 13.

There are 14 groups.

Use an area model alongside written division to model the process.

$$377 \div 13 = ?$$

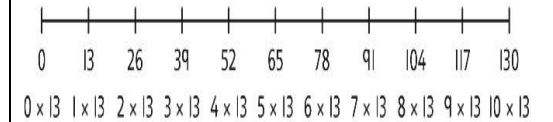


$$377 \div 13 = 29$$

Use long division where factors are not useful (for example, when dividing by a 2-digit prime number).

Write the required multiples to support the division process.

$$377 \div 13 = ?$$



$$798 \div 21 = 38$$

An example of long division:

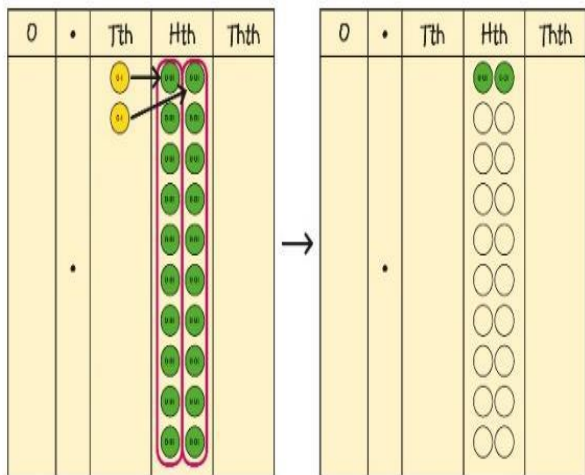
$$\begin{array}{r}
 3 \\
 21 \overline{) 798} \\
 - 630 \\
 \hline
 168
 \end{array}$$

$$\begin{array}{r}
 38 \\
 21 \overline{) 798} \\
 - 630 \\
 \hline
 168 \\
 - 168 \\
 \hline
 0
 \end{array}$$

Divisions with a remainder explored in problem-solving contexts.

Dividing by 10, 100 and 1,000

Use place value equipment to explore division as exchange.

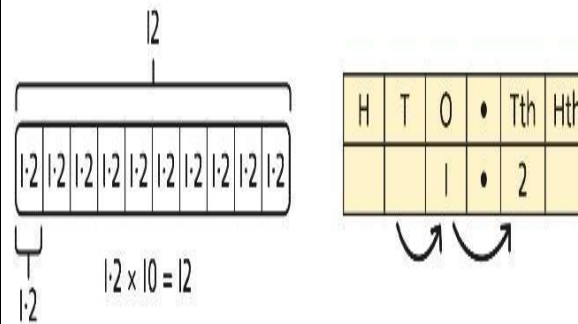


Exchange each 0.1 for ten 0.01s.

Divide 20 counters by 10.

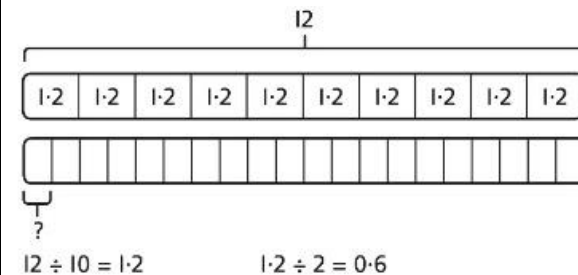
*0.2 is 2 tenths.
2 tenths is equivalent to 20 hundredths.
20 hundredths divided by 10 is 2 hundredths.*

Represent division to show the relationship with multiplication. Understand the effect of dividing by 10, 100 and 1,000 on the digits on a place value grid.



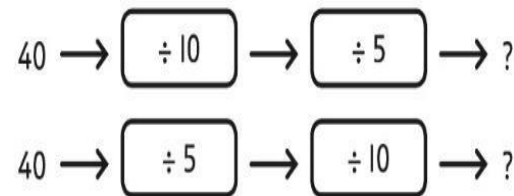
Understand how to divide using division by 10, 100 and 1,000.

$12 \div 20 = ?$



Use knowledge of factors to divide by multiples of 10, 100 and 1,000.

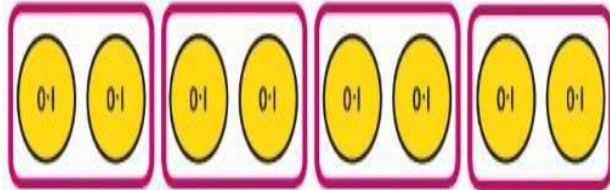
$40 \div 50 = \square$



$40 \div 5 = 8$
 $8 \div 10 = 0.8$
So, $40 \div 50 = 0.8$

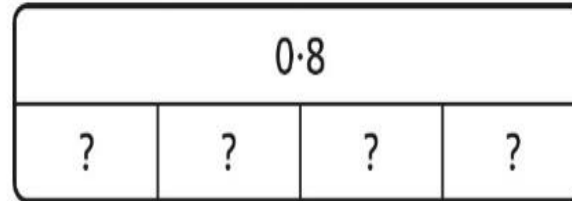
Dividing decimals

Use place value equipment to explore division of decimals.



8 tenths divided into 4 groups. 2 tenths in each group.

Use a bar model to represent divisions.



$$4 \times 2 = 8$$

$$8 \div 4 = 2$$

So, $4 \times 0.2 = 0.8$

$$0.8 \div 4 = 0.2$$

Use short division to divide decimals with up to 2 decimal places.

$$\begin{array}{r} \cdot \\ 8 \overline{) 4 \cdot 2 \ 4} \end{array}$$

$$\begin{array}{r} 0 \cdot \\ 8 \overline{) 4 \cdot \overset{4}{2} \ 4} \end{array}$$

$$\begin{array}{r} 0 \cdot 5 \\ 8 \overline{) 4 \cdot \overset{4}{2} \ \overset{2}{4}} \end{array}$$

$$\begin{array}{r} 0 \cdot 5 \ 3 \\ 8 \overline{) 4 \cdot \overset{4}{2} \ \overset{2}{4}} \end{array}$$

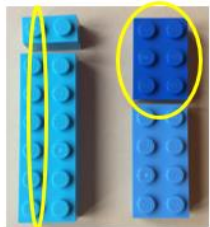
Progression in Fractions UKS2

Y5 Concrete

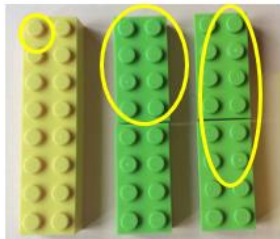
Y5 Pictorial

Y5 Abstract

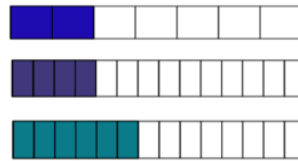
Objective 1: Compare and order fractions whose denominators are all multiples of the same number.



$$\frac{1}{7} = \frac{6}{14} = \frac{3}{7}$$



$$\frac{1}{16} = \frac{1}{2} = \frac{3}{4} = \frac{6}{8}$$



$$\frac{2}{7} = \frac{4}{14} = \frac{6}{21}$$



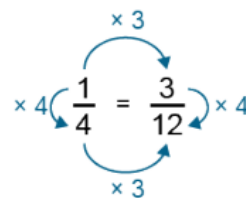
$$\frac{3}{8}$$



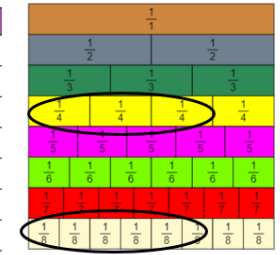
$$\frac{7}{16}$$



$$\frac{12}{16} = \frac{3}{4}$$



x	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16
5	5	10	15	20
6	6	12	18	24
7	7	14	21	28

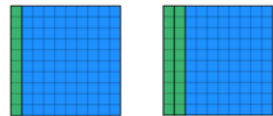


$$\frac{3}{4} = \frac{6}{8}$$

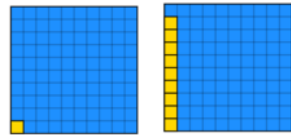
Complete the table to show three more fractions that are equivalent to the first:

Fraction	Equivalent fractions			
$\frac{1}{2}$	$\frac{2}{4}$			
$\frac{1}{4}$	$\frac{2}{8}$			
$\frac{1}{3}$				

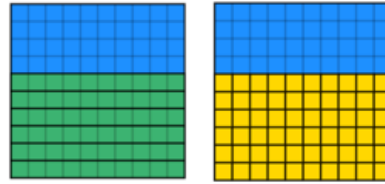
Objective 2: Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.



$$\frac{1}{10} \quad \frac{2}{10} = \frac{1}{5}$$

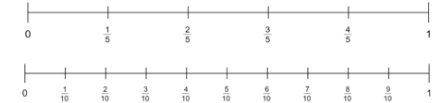


$$\frac{1}{100} \quad \frac{9}{100}$$



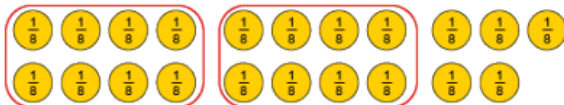
$$\frac{6}{10} = \frac{60}{100}$$

$$\begin{array}{ccc} & \times 10 & \\ \curvearrowright & & \curvearrowleft \\ \frac{6}{10} & = & \frac{60}{100} \\ \curvearrowleft & & \curvearrowright \\ & \times 10 & \end{array}$$

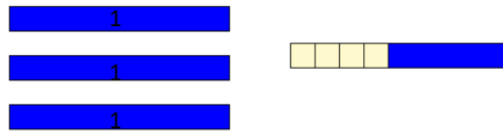


$$\begin{array}{ccc} \div 2 & & \\ \curvearrowright & & \curvearrowleft \\ \frac{4}{10} & = & \frac{2}{5} \\ \curvearrowleft & & \curvearrowright \\ \times 2 & & \end{array}$$

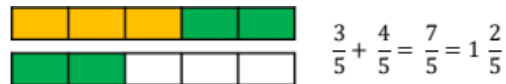
Objective 3: Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number.



$$1 \quad 1 \quad \frac{5}{8} \\ \frac{21}{8} = 2\frac{5}{8}$$



$$3 \quad \frac{4}{9} \\ 3\frac{4}{9} = \frac{31}{9}$$



$$\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$$

Express the following improper fractions as mixed numbers.

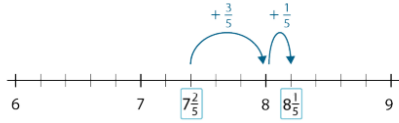
$$\frac{17}{2} \quad \frac{13}{6} \quad \frac{28}{10} \quad \frac{41}{7}$$

Express the following mixed numbers as improper fractions.

$$4\frac{1}{8} \quad 6\frac{4}{9} \quad 3\frac{11}{12} \quad 8\frac{2}{3}$$

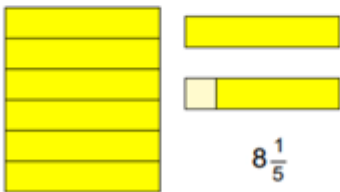
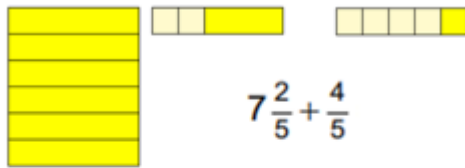
Objective 4: Add and subtract fractions with the same denominator and denominators that are multiples of the same number.

adding to reach the whole number, then adding the remaining fraction



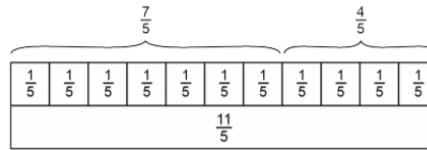
$$7\frac{2}{5} + \frac{4}{5} = 8\frac{1}{5}$$

$$8\frac{1}{5} - \frac{4}{5} = 7\frac{2}{5}$$

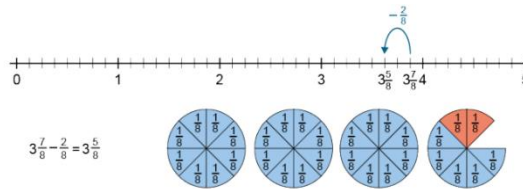


Language focus

"7 one-fifths plus 4 one-fifths is equal to 11 one-fifths."



$$\frac{7}{5} + \frac{4}{5} = \frac{11}{5}$$



$$3\frac{7}{8} - \frac{2}{8} = 3\frac{5}{8}$$

1. It is a $2\frac{3}{4}$ km cycle ride to my friend's house, and a further $\frac{3}{4}$ km ride to the park. How far do I have to cycle altogether?

2. I have 5m of rope. I cut off $\frac{4}{10}$ m. How much rope is left?

3. Fill in the missing numbers.

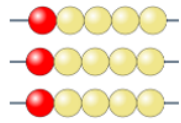


4. The table below shows the number of hours Josie read each day during a school week. For how long did Josie read altogether?

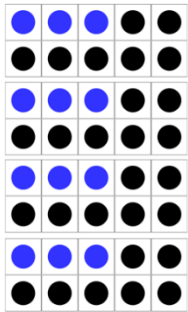
Mon	Tues	Wed	Thurs	Fri
$1\frac{3}{4}$ hours	1 hour	$1\frac{1}{4}$ hours	$1\frac{1}{4}$ hours	$2\frac{3}{4}$ hours

5. A tailor has $3\frac{7}{10}$ m of ribbon. She uses $1\frac{9}{10}$ m to complete a dress. How much ribbon is left?

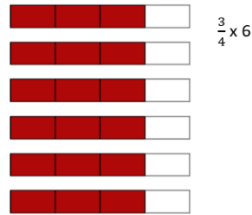
Objective 5: Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.



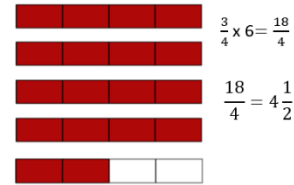
$$\frac{1}{5} \times 3 = \frac{3}{5}$$



$$\frac{3}{10} \times 4 = \frac{12}{10} = 1\frac{1}{5}$$



$$\frac{3}{4} \times 6$$



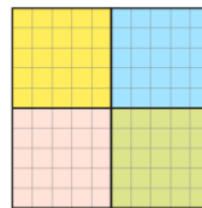
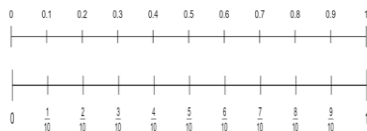
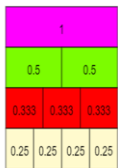
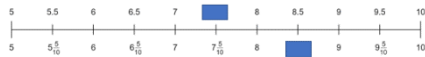
$$\frac{3}{4} \times 6 = \frac{18}{4}$$

$$\frac{18}{4} = 4\frac{1}{2}$$

$$\frac{1}{2} \times 5 = \frac{1}{2} \times \frac{5}{1}$$

$$\frac{3}{5} \times 4 = \frac{3}{5} \times \frac{4}{1} = \frac{12}{5} = 2\frac{2}{5}$$

Objective 6: Read and write decimal numbers as fractions [for example, 0.71 = 71/100]



$$\frac{1}{4} = \frac{25}{100} = 0.25$$

Fill in the missing symbols (<, > or =).

$$\frac{1}{10} \square 0.75$$

$$0.4 \square \frac{1}{4}$$

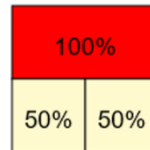
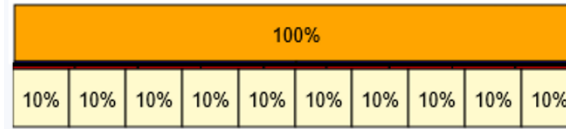
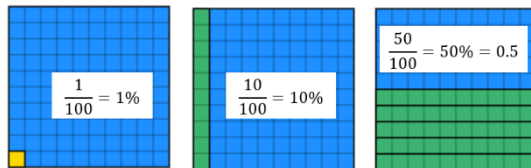
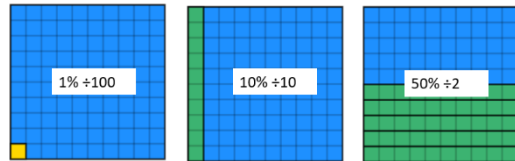
$$0.5 \square \frac{1}{5}$$

$$\frac{3}{4} \square 0.75$$

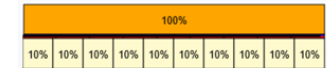
$$0.8 \square \frac{4}{5}$$

$$\frac{1}{2} \square 0.2$$

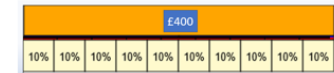
Objective 7: Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal.



100% = 500
 What is 10%?
 What is 50%
 Is 70% = 350



100% = £400
 What is 30%?
 Is 20% = £90?



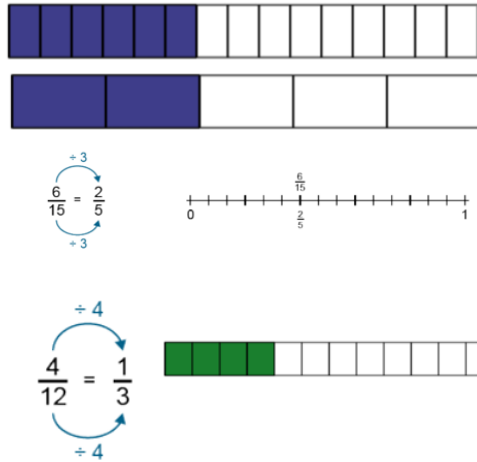
100%	50%	25%	75%	10%
1000 m	500 m	250 m	750 m	100 m
160 kg	80 kg	40 kg	120 kg	16 kg
1080 mm	540 mm	270 mm	810 mm	108 mm

Y6 Concrete

Y6 Pictorial

Y6 Abstract

Objective 1: Use common factors to simplify fractions; use common multiples to express fractions in the same denominator.



×	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

$$\frac{4}{12} = \frac{1}{3}$$

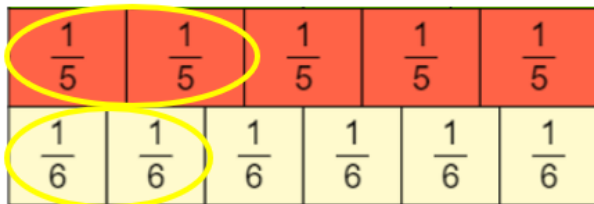
÷ 4

Sort these fractions according to whether they are expressed in their simplest form or not.

- $\frac{3}{15}$ $\frac{2}{5}$ $\frac{4}{20}$ $\frac{25}{36}$ $\frac{1}{6}$ $\frac{7}{21}$ $\frac{18}{30}$ $\frac{9}{17}$ $\frac{5}{15}$ $\frac{11}{20}$ $\frac{23}{30}$

Fraction in its simplest form	Fraction <u>not</u> in its simplest form

Objective 2: Compare and order fractions, including fractions > 1.



$$\frac{2}{5} > \frac{2}{6}$$

$$\frac{2}{5} = \frac{12}{30}$$

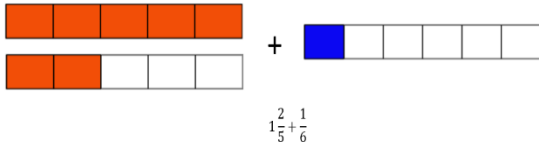
$$\frac{2}{6} = \frac{10}{30}$$

LCM of 5 and 6 = 30

Without using a common denominator, put each set of fractions in order from smallest to largest.

- a. $\frac{10}{8}$ $\frac{7}{8}$ $\frac{5}{8}$ $\frac{3}{8}$ $\frac{8}{8}$ $\frac{4}{8}$ $\frac{2}{8}$

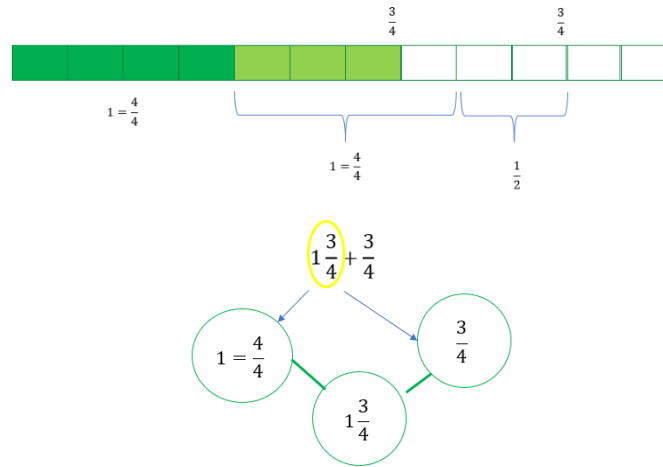
Objective 3: Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.



$$\frac{7}{5} + \frac{1}{6}$$

$$\frac{42}{30} + \frac{5}{30} = \frac{47}{30}$$

$$\frac{47}{30} = 1\frac{17}{30}$$



$$2\frac{1}{2} + \frac{3}{4} =$$

$$\frac{7}{10} + \frac{5}{10} + \frac{3}{10}$$

$$\frac{8}{9} + \frac{8}{9} - \frac{1}{9}$$

$$3\frac{7}{10} + 2\frac{9}{10}$$

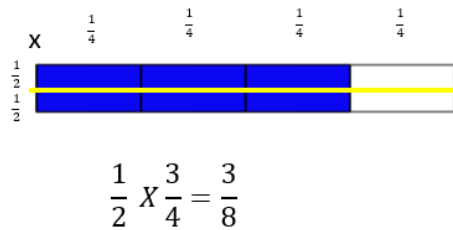
$$\frac{13}{8} + \frac{11}{8}$$

$$7\frac{1}{6} - 1\frac{2}{6}$$

$$\frac{17}{3} - \frac{5}{3}$$

$$6\frac{2}{7} + \frac{2}{3} = \frac{18}{21} + \frac{14}{21}$$

Objective 4: Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$].



$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

$$\frac{3}{5} \times \frac{1}{4} = \frac{3}{20}$$

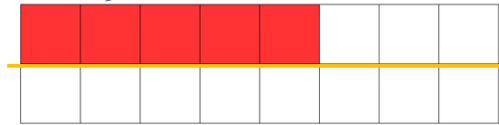
Objective 5: Divide proper fractions by whole numbers [for example, $6/8 \div 3 = 1/4$]

Dividing by 2 is the same as multiplying by $\frac{1}{2}$



$$\frac{5}{8} \div 2 =$$

The denominator is now 16.



The reciprocal:

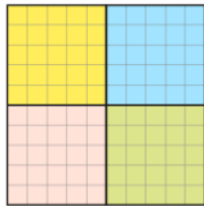
$$\frac{1}{8} \div 2 = \frac{1}{8} \div \frac{1}{2}$$

$$\frac{1}{8} \times \frac{2}{1} = \frac{2}{8}$$

Objective 6: Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8].



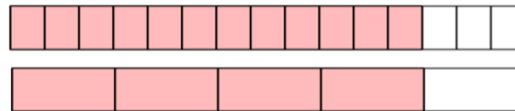
1.25



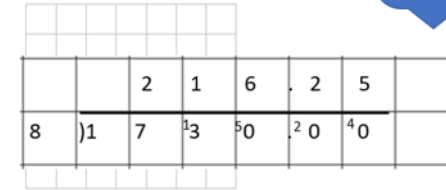
$$\frac{1}{4} = \frac{25}{100} = 0.25$$

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array} \quad (15 \times 2) \quad 28 \frac{12}{15} = \frac{4}{5}$$

$$28 \frac{4}{5} = 28.8$$



1730 ÷ 8



216 r 2
2
216
8
1
216
4

Standard Written Method

	Addition	Subtraction	Multiplication	Division
Reception	<p>$1+5=$ $1+6=$</p>	<p>0 1 2 3 4 5 6 7 8 9 10</p> <p>$3-1=\square$ $2-1=\square$</p> <p>$8-1=\square$ $4-1=\square$</p> <p> $7-4 = \underline{\quad}$</p>	<p>0 1 2 3 4 5 6</p>	<p>0 1 2 3 4 5 6 7 8 9 10</p>
Year 1		<p>$10-6=4$</p>	<p>0 2 4 6 8 10</p> <p>$1+1=2$ $2+2=4$ $3+3=6$ $4+4=8$ $5+5=10$</p>	<p>$10 \div 2 =$</p>

Year 2	$\begin{array}{r} 59 \\ + 43 \\ \hline 102 \end{array}$	$\begin{array}{r} 67^1 3 \\ - 49 \\ \hline 24 \end{array}$	$8 \times 5 = 40$	$35 \div 5 = 7$
Year 3	$\begin{array}{r} 523 \\ + 393 \\ \hline 916 \end{array}$	$\begin{array}{r} 4^1 523 \\ - 393 \\ \hline 130 \end{array}$	$\begin{array}{r} 59 \\ \times 6 \\ \hline 54 \text{ (6x9)} \\ 300 \text{ (6x50)} \\ \hline 354 \end{array}$	$\begin{array}{r} 4 \\ 8 \overline{)32} \end{array}$
Year 4	$\begin{array}{r} 1,312 \\ + 3,094 \\ \hline 4,406 \end{array}$	$\begin{array}{r} 6,273 \\ - 1,093 \\ \hline 5,180 \end{array}$	$\begin{array}{r} 159 \\ \times 16 \\ \hline 1,590 \\ + 2,544 \\ \hline \end{array}$	$\begin{array}{r} 135 \\ 7 \overline{)945} \end{array}$

<p>Year 5</p>	<p>13,123 <u>30,943+</u> 44,066</p>	<p>¹<u>62,743</u> ¹<u>10,923-</u> 51,820</p>	<p>2259 <u>6x</u> 54 300 1,200 <u>12,000+</u> 13,554</p>	<p>279 r5 6 <u>)1679</u></p>
<p>Year 6</p>	<p>613,123 1310,943+ 744,066</p>	<p>6112,1743 100,923- 511,820</p>	<p>2259 46x 13,554 901,360+ 103,914</p>	<p>0389.739 23 <u>)8964</u> 69 206 184 0224 207- 0170 161- 0090 69- 210 207- 003</p>

