



Calculation Progression

“Go down deep enough into anything and you will find mathematics.”

EYFS – YEAR SIX

SEPTEMBER 2021

Review:

September 2024

Addition

Contextualise the mathematics

WHAT DOES THIS NUMBER REPRESENT?

Expose mathematical structure and work systematically

Expect children to use correct terminology and express reasoning

- ❖ Use **stem sentences**.
- ❖ Answer in **complete sentence**.

Identify difficult points

- ❖ Be aware of common misconceptions.
- ❖ Actively seek to uncover these.

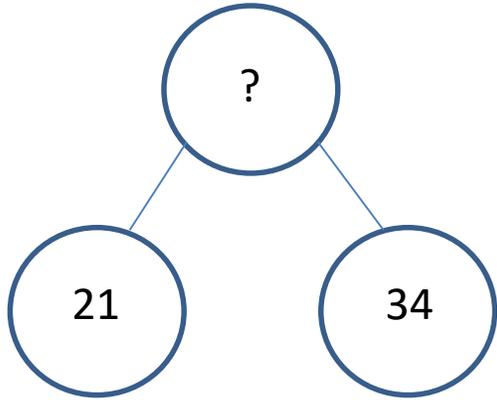
Move between concrete, pictorial and the abstract (CPA)

Teach inequality alongside all mathematical concepts.



< and > can also help deep understanding of key concepts.

Conceptual variation in addition - different ways to ask children to solve 21+34



?	
21	34

Word problem:
In Year 3, there are 21 children and in Year 4, there are 34 children. How many children in total?

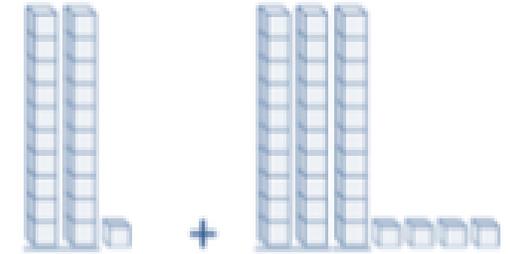
$21 + 34 = 55$. Prove it.

$$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$$

$$21 + 34 =$$

= $21 + 34$

Calculate the sum of twenty-one and thirty-four.



10s	1s
<div style="display: flex; justify-content: space-around;"> 10 10 </div>	<div style="display: flex; justify-content: center;"> 1 </div>
<div style="display: flex; justify-content: space-around;"> 10 10 10 </div>	<div style="display: flex; justify-content: center;"> ? </div>
<div style="display: flex; justify-content: center;"> ? </div>	<div style="display: flex; justify-content: center;"> 5 </div>

It is important to use conceptual variation in order for the children to deepen their understanding of the mathematical structure.

Children will find different ways easier or harder to understand than others. We encourage children to work towards looking for the most efficient methods once they have conceptual understanding of the maths.

Subtraction

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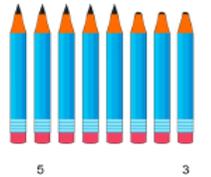
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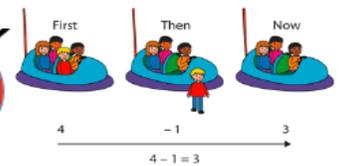
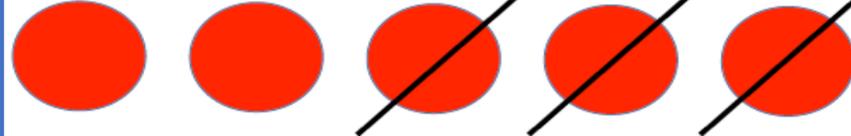


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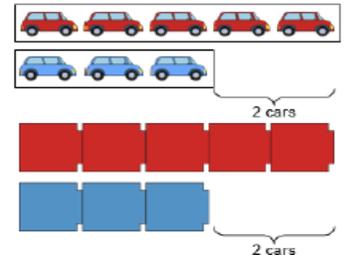
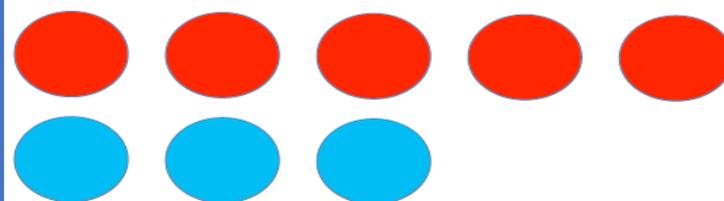
Partitioning



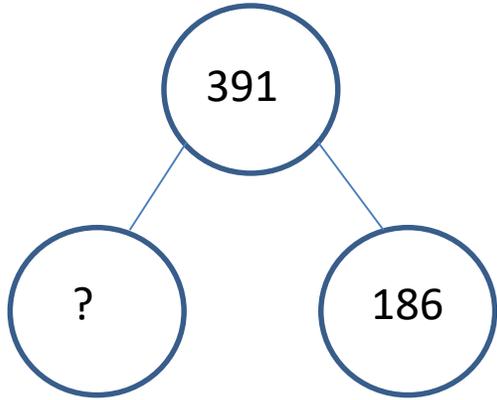
Reduction



Difference



Conceptual variation in subtraction – different ways to ask children to solve 391-186



391	
?	186

Raj spent £391, Timmy spent £186. How much more did Raj spend?

Calculate the difference between 391 - 186.

$$\begin{array}{r} 391 \\ -186 \\ \hline \end{array}$$

$$21 + 34 =$$

$$\blacksquare = 391 - 186$$

What is 186 less than 391?

Missing digit calculations

$$\begin{array}{r} 39\blacksquare \\ - \blacksquare\blacksquare6 \\ \hline \blacksquare05 \end{array}$$

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Multiplication

Contextualise the mathematics

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Move between concrete, pictorial and the abstract (CPA)

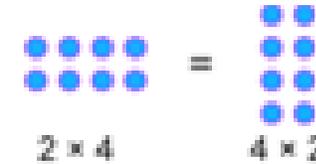
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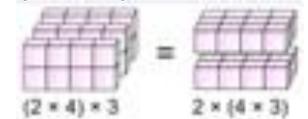
Commutative Law:

This law states that the order you multiply numbers in does not matter. E.g. $2 \times 4 = 4 \times 2$



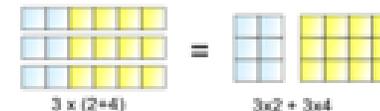
Associative Law:

This law states that the order you carry out the multiplication does not impact the answer. E.g. $3 \times (2 \times 4) = (3 \times 2) \times 4$



Distributive Law:

This law states that you can partition numbers and multiply them without changing the answer. E.g. $3 \times 6 = 3 \times (2 + 4) = (3 \times 2) + (3 \times 4)$



Conceptual variation in multiplication – different ways to ask children to solve 6 x 23

<table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="width: 16.6%;">23</td> </tr> <tr> <td colspan="6" style="height: 20px; border: 1px solid blue;"></td> </tr> <tr> <td colspan="6" style="text-align: center; padding: 10px;">?</td> </tr> </table>	23	23	23	23	23	23							?						<p>Max had to swim 23 lengths, 6 times a week.</p> <p>How many lengths did he swim in one week?</p> <p>With counters, prove that $6 \times 23 = 138$</p>	<p>Find the product of 6 and 23</p> <p>$6 \times 23 =$</p> <p>_____ = 6×23</p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: right;"> $\begin{array}{r} 6 \\ \times 23 \\ \hline \end{array}$ </div> <div style="text-align: left;"> $\begin{array}{r} 23 \\ \times 6 \\ \hline \end{array}$ </div> </div>	<p>What is the calculation? What is the product?</p> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #f28b82;"> <th style="width: 25%;">100s</th> <th style="width: 25%;">10s</th> <th style="width: 25%;">1s</th> </tr> </thead> <tbody> <tr> <td style="height: 100px;"></td> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">  </td> </tr> </tbody> </table>	100s	10s	1s			
23	23	23	23	23	23																						
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It is important to use conceptual variation in order for the children to deepen their understanding of the mathematical structure.

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Division

Contextualise the mathematics

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Grouping:

Grouping is when we know how many are in each group but not how many groups there will be.



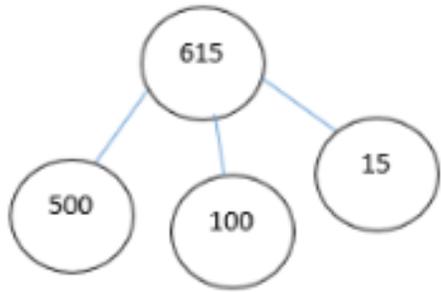
Sharing:

Sharing is when we know how many groups there are but not how many are in each group.



Conceptual variation in division – different ways to ask children to solve $615 \div 5$

Using the part whole model below, how can you divide 615 by 5 without using short division.



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5\sqrt{615}$$

$$615 \div 5 =$$

$$\underline{\quad} = 615 \div 5$$

What is the calculation?
What is the answer?

100s	10s	1s

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EYFS

Key Vocabulary

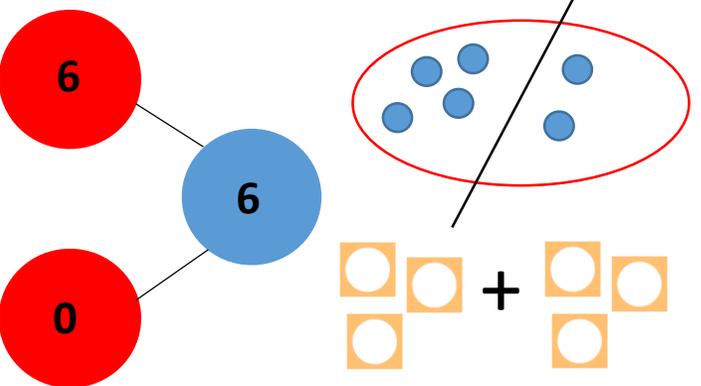
Number	Geometry	Statistics	Measurement
<p>number, subitising, sort, group, digit, one more, one less, matched, fewer, greater than, less than, equal to, most, least, fewest, smallest, greatest, altogether, group, number sentence, take away, add, number bond, part-whole sharing, grouping, doubling, halving half, quarter, parts of a whole.</p>	<p>side, rectangle, square, triangle, circle, 2D shape, 3D shape, cube, cuboid, sphere, pyramid, cylinder, cone, circle, pattern, flat, curved, shape, face, edge, vertex, vertices, position, left, right, forwards, backwards, above, below, top, middle, bottom, up, down, in between, over, under, direction.</p>	<p>count, sort, group, set, list, tally.</p>	<p>long, longer, short, tall, tallest, length, height, compare, measure, full, empty, days of the week, morning, afternoon, evening, night, before, after, next, last, clock, watch, money, pound, pence, coin, note.</p>

Addition

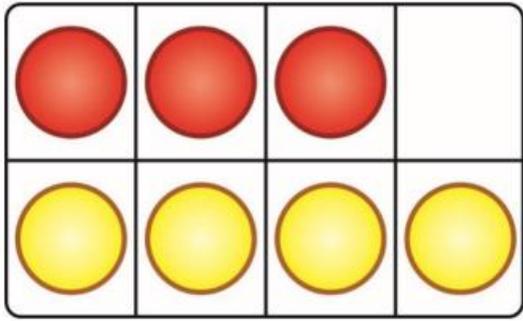
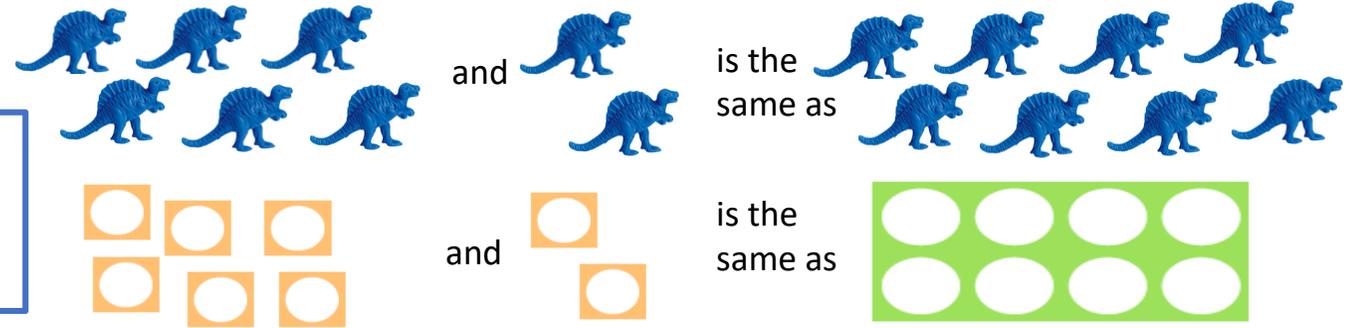
In EYFS pupils should be developing their concept of the number system through the use of concrete materials and pictorial representations. They should experience practical calculation opportunities using a wide variety of equipment, e.g. role play, outdoor play, counters, cubes, numicon, ten frames etc. They develop ways of recording calculations using pictures, etc.

Pupils must be provided with opportunities to develop their skills so that they are able to count reliably, including one to one correspondence and count on from a given number.

Pupils must be provided with many opportunities to **subitise** numbers so they are equipped to calculate rather than count as they progress through their learning. Pupils should be given the opportunity to count out sets of objects and then combine them to make a total.

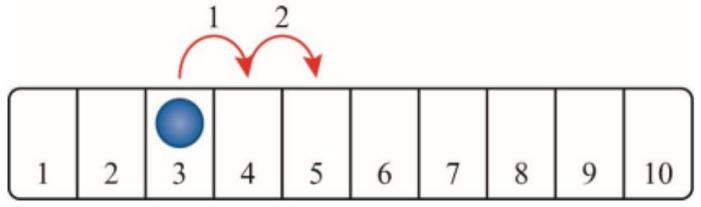
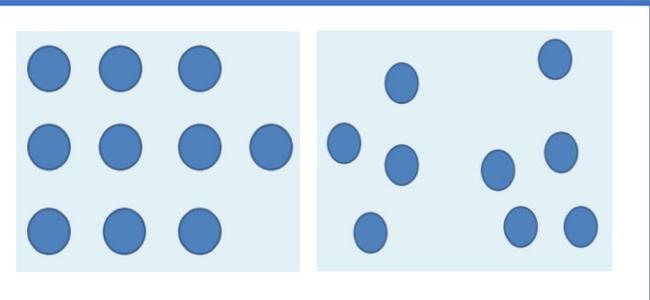


Pupils should recognise different combinations of making single digit numbers.



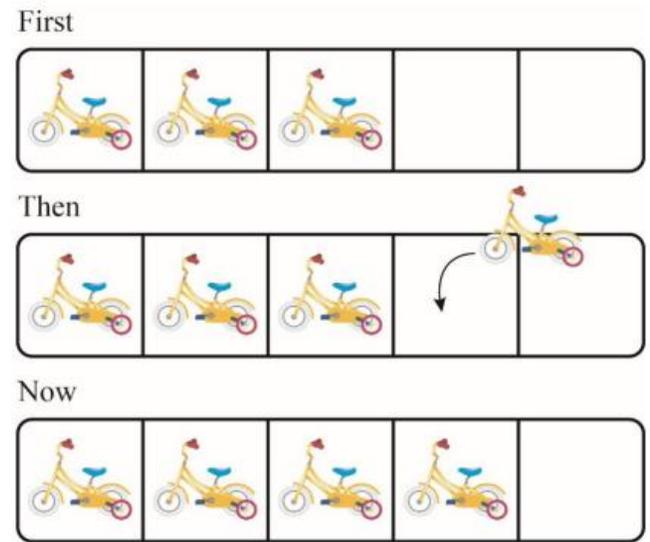
Pupils should use counters or cubes in a part-whole model to find the whole.

Subitising
Show the dots for 3 seconds.
How many dots can you see?
How did you see them?
Did you calculate? E.g.. $9 + 1$ and $4 + 5$



Pupils should start at the larger number and count on the smaller number to find the total.

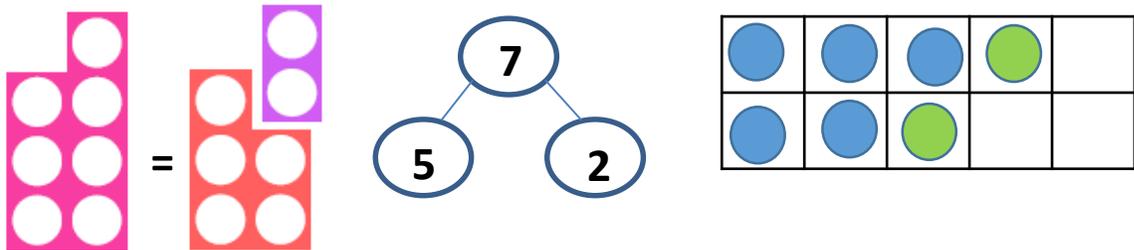
Pupils should represent first, then, now stories on a five frame. They make the first number and then add one more.



Subtraction

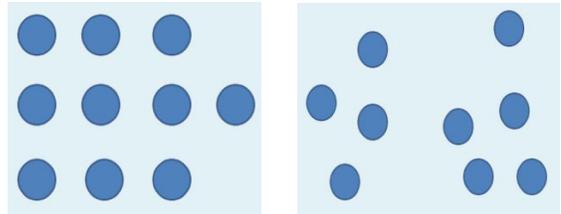
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Pupils should recognise different combinations of making single digit numbers using part whole, numicon and tens frame. E.g. 7 can be made as:

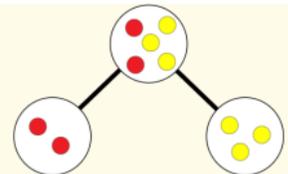


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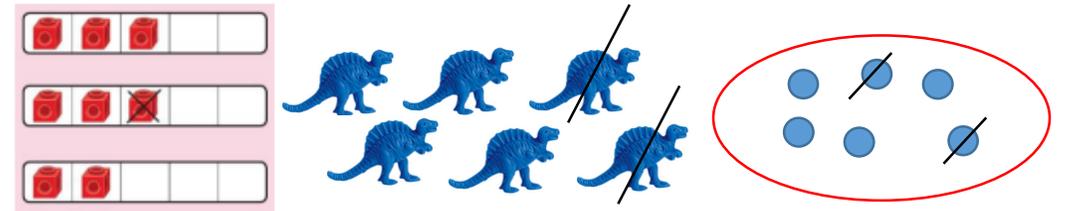
Pupils to use counters or cubes to represent objects in a part-whole model.



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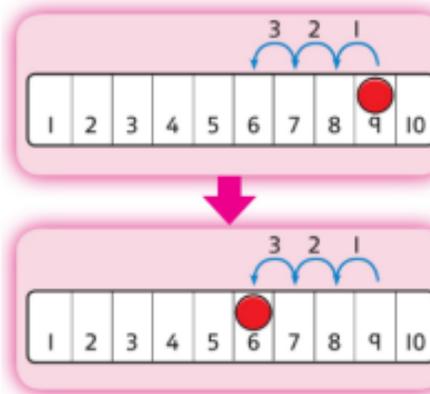
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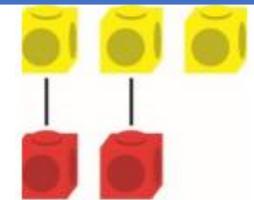
After pupils have recognised different ways of making numbers they should use this number bond knowledge to help with subtraction facts.

Children should use concrete materials to start counting back in order to solve subtraction problems.



Pupils should use a number track and a counter. They start at the larger number and count back the smaller number to find the answer.

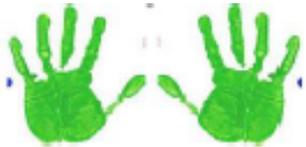
Pupils should be able to compare the amount in each group.



*There are more yellow cubes.
There are fewer red cubes.*

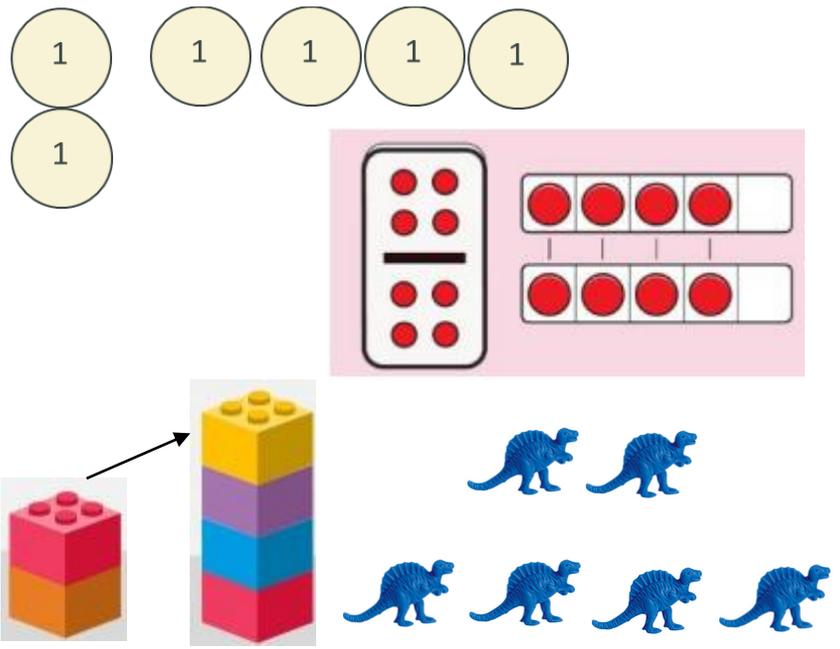
Multiplication

Real life contexts

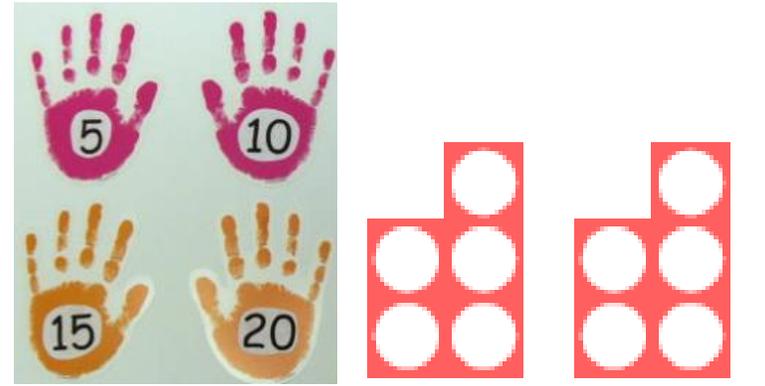


How many fingers on one hand?
How many fingers on two hands?...

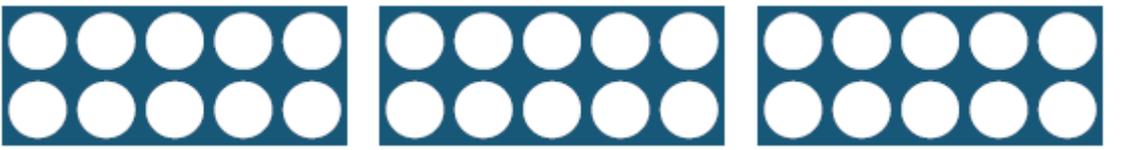
Doubling



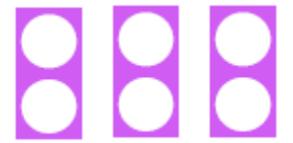
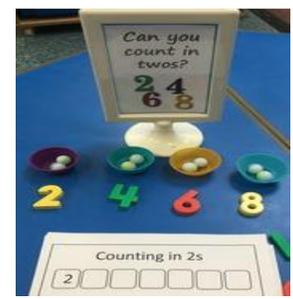
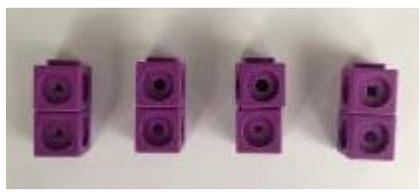
Count in multiples of 5



Count in multiples of 10



Count in multiples of 2



Division

Real life contexts

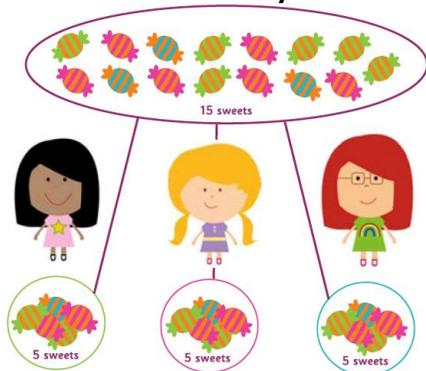
Grouping

Mum has 6 socks. She grouped them into pairs. How many pairs did she make?

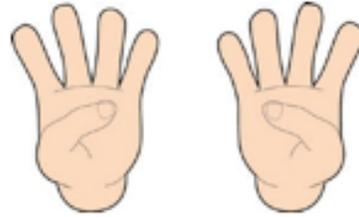


Sharing

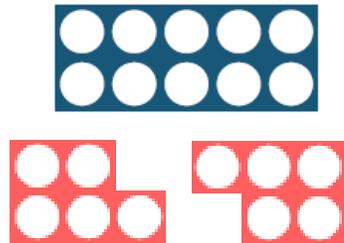
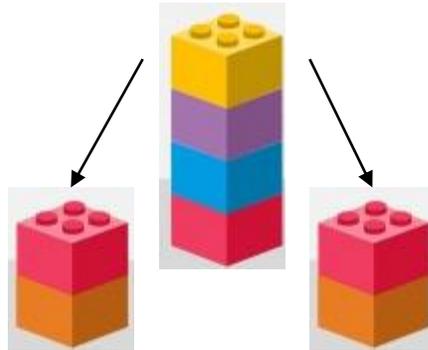
I have 15 sweets. I want to share them with my 3 friends. How many will we have each?



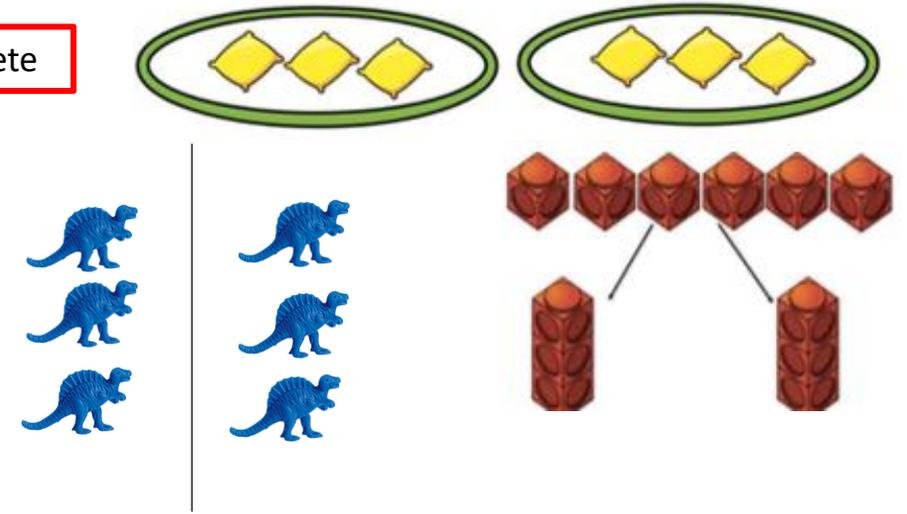
Halving



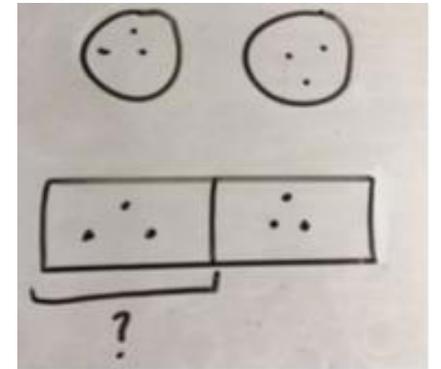
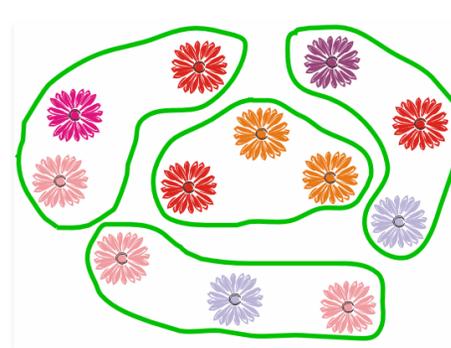
Half of 8 is 4



Concrete



Pictorial

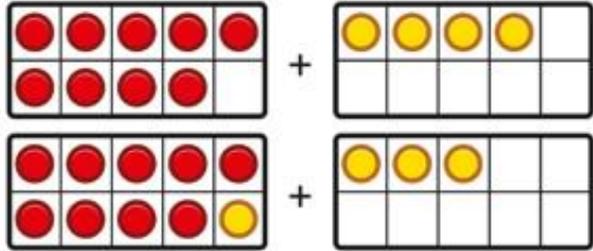


Year 1

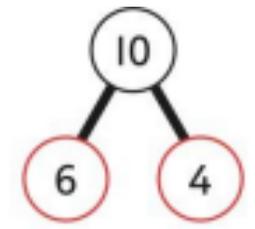
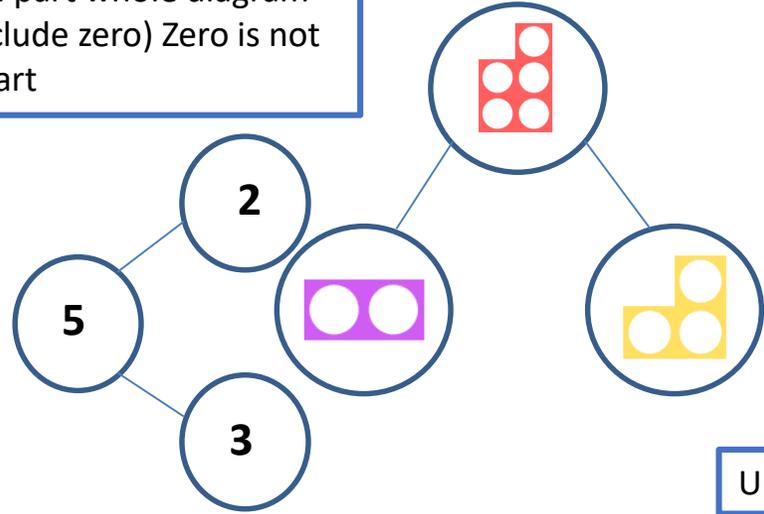
Key Vocabulary			
Number	Geometry	Statistics	Measurement
number, subitising, sort, group, digit, one more, one less , matched, fewer, greater than, less than, equal to, most, least, fewest, smallest, greatest, number line, number track, pattern, order, tens, ones, compare, 100 square, number square, place value grid, numeral, partition, group, part whole, plus, whole, part , number sentence, altogether, in total , add, count on, missing part , take away, subtract, count backwards, difference, in total, addition, subtraction , number bond, part-whole, fact family , tens, ones, equal groups, array, row, column, double, twice, share , sharing, grouping, multiply, fraction , half, halves , quarter, parts of a whole, equal parts	turn, half turn, quarter turn, three quarter turn, whole turn , position, left, right, forwards, backwards, above, below, top, middle, bottom, up, down, in between, 3D shape, cube, cuboid, sphere, pyramid, cylinder, cone, 2D shape, circle, triangle, rectangle, face, edge, vertex, vertices, pattern, repeated	count, sort, group, set, list, tally	before, after, yesterday, today, tomorrow, day, week, lower, faster, month, year, calendar, date, minute hand, hour hand, o'clock, half past, second, minute, hour, heavier, heaviest, lighter, capacity, balance scales , full, empty, weight, weigh, balanced , estimate, pound, pence, coin, note, long, longer, longest , short, shorter, shortest , tall, taller , tallest, length, height, compare, measure, distance, ruler, centimetre

Addition

Bridging the 10 using number bonds



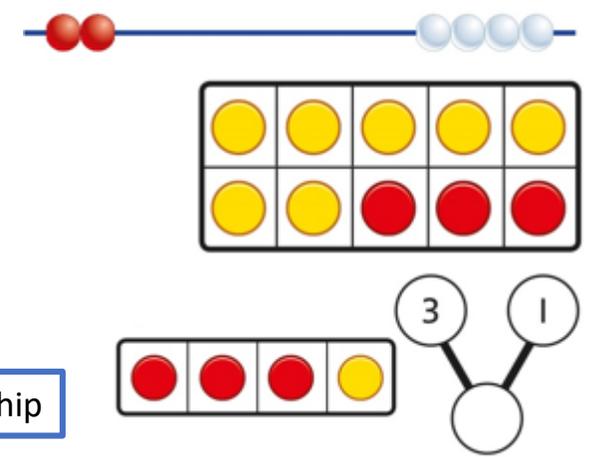
Use part whole diagram (include zero) Zero is not a part



$$6 + 4 = 10$$

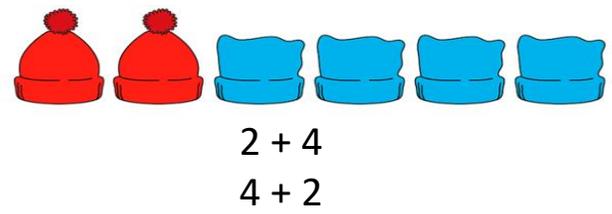
$$6 + 4 = 10$$

Knowing and finding number bonds

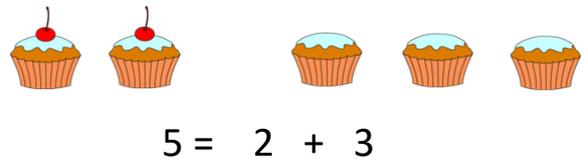


Understand part-whole relationship

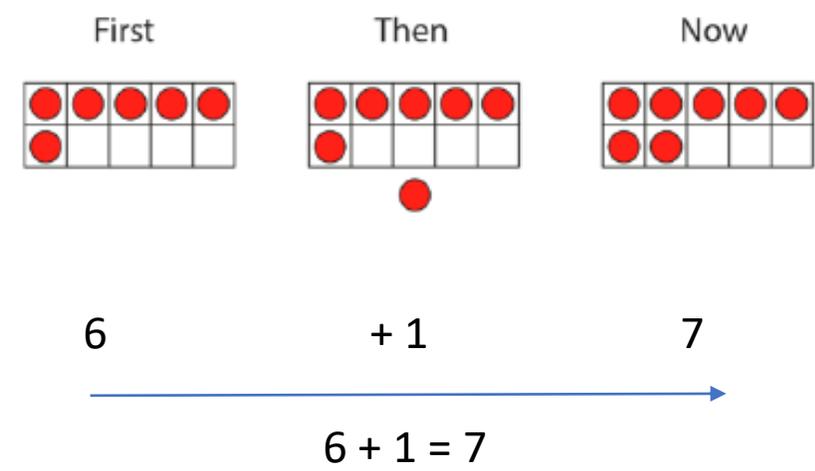
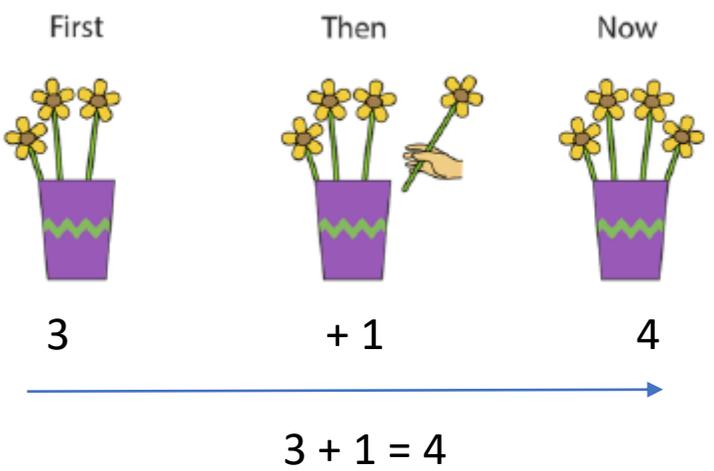
Start with expressions (no = sign)



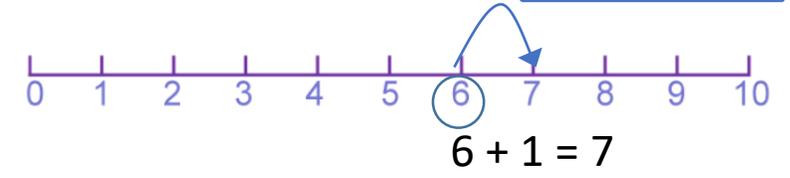
Move on to equations (has = sign)



Key skills:
 Adding 0 and 1 to a number
 Addition bonds within 10 e.g. $5 = 4 + 1$
 Addition bonds that = 10 e.g. $10 = 6 + 4$



Number line

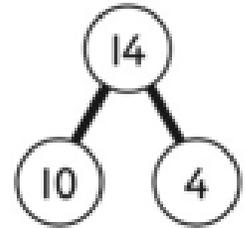


Teacher to use the bar model in summer term

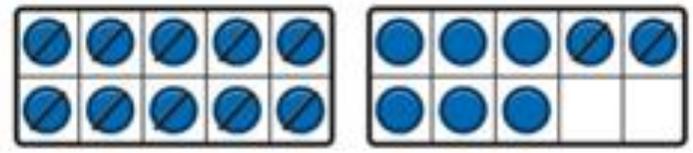


Subtraction

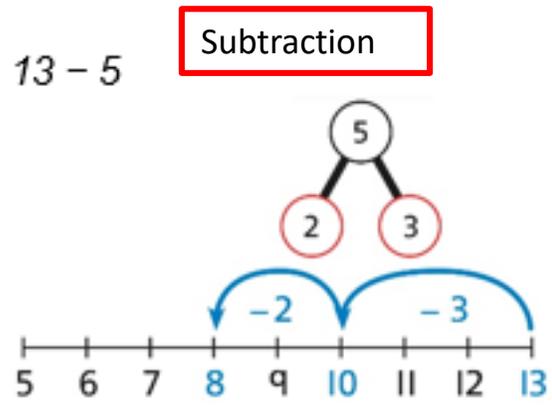
Subtracting 10s and 1s



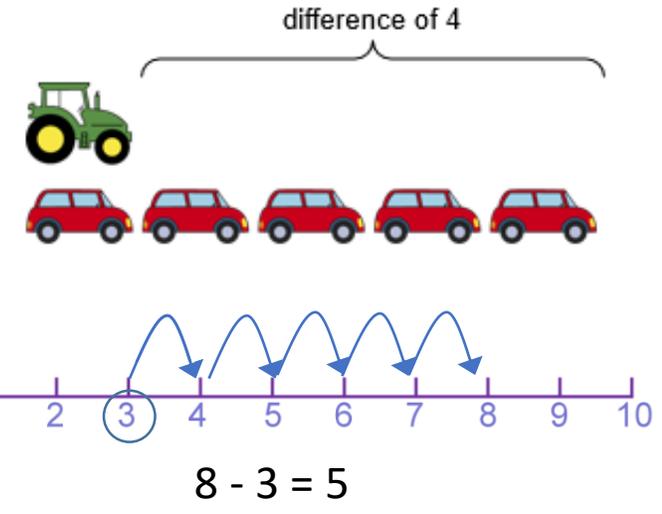
$19 - 14$
 $19 - 10 = 9$
 $9 - 4 = 5$
 So, $19 - 14 = 5$



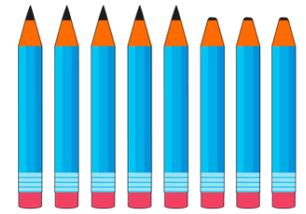
First subtract the 10, then subtract 2.



Difference

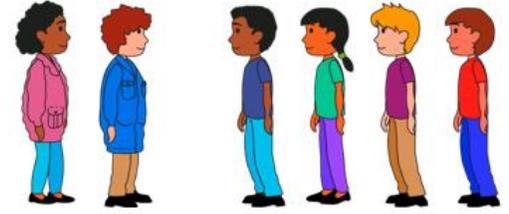


Start with expressions (no = sign)

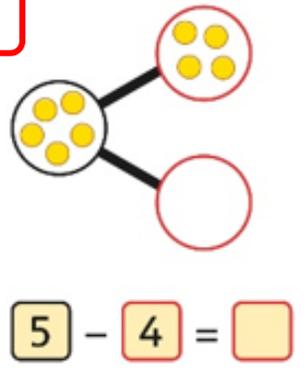


$8 - 3$

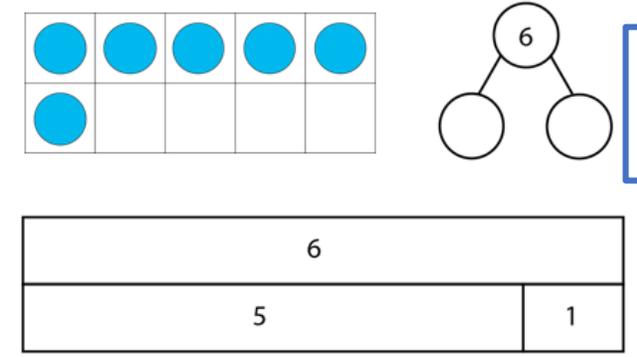
Move on to equations (has = sign)



$6 - 2 = 4$

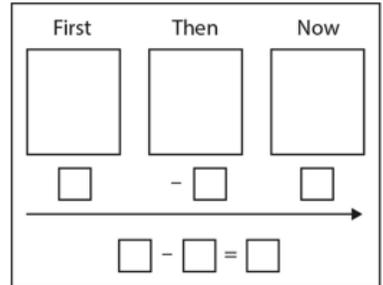
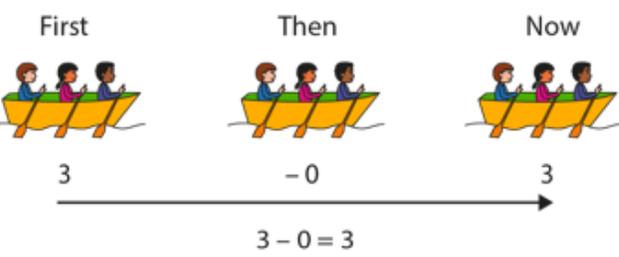


Use part whole diagram (include zero)



Partitioning single digit numbers

Reduction

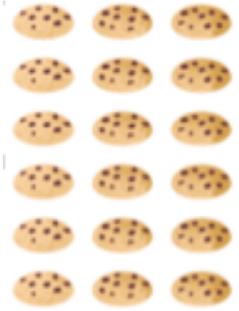


Key skills:
 Bonds within 10
 Bonds from 10
 Subtracting 0 and 1 from a number

Teacher to use the bar model in summer term



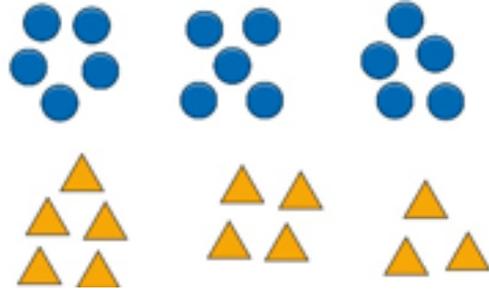
Multiplication



Real life contexts

3 cookies in 1 row
6 cookies in 2 rows
12 cookies in 4 rows
___ cookies in 6 rows

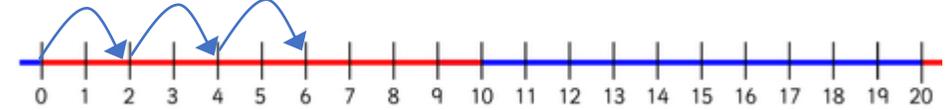
Recognise equal and unequal groups



Count in multiples of 2



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20



Make equal groups, add them and show repeated addition in concrete and pictorial representations.



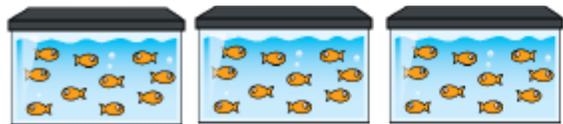
$$2 + 2 + 2 + 2 + 2 =$$



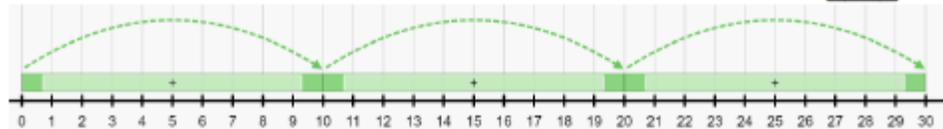
There are ___ groups of ___ pencils.



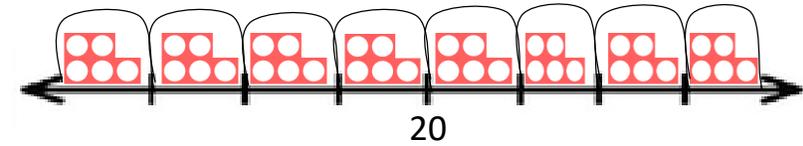
There are ___ groups of ___ flowers.



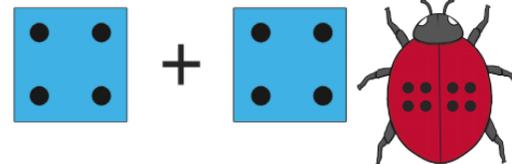
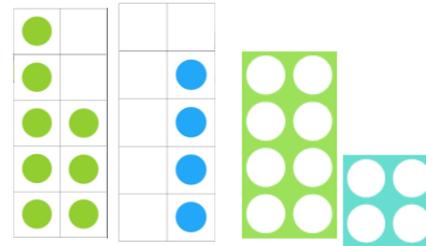
___ + ___ + ___ = ___
There are ___ fish.



Count in multiples of 5



Doubling



Count in multiples of 10

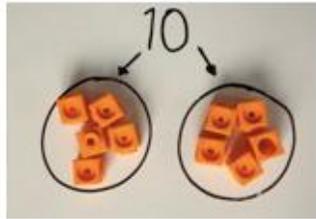
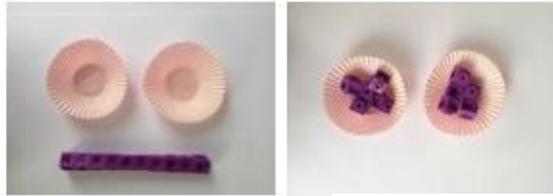


There are ___ flowers in each bunch.
There are ___ bunches.
There are ___ flowers altogether.

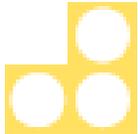
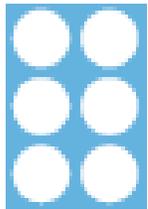
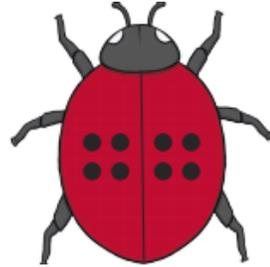


Division

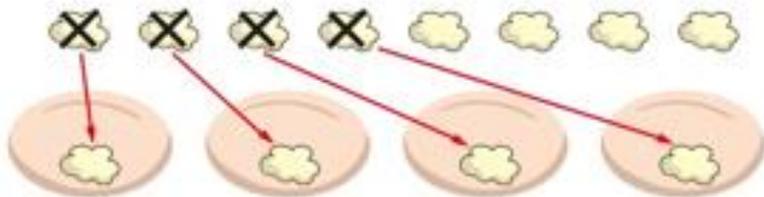
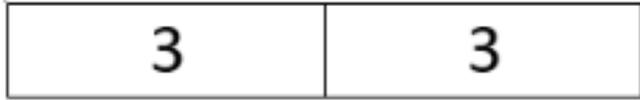
Sharing



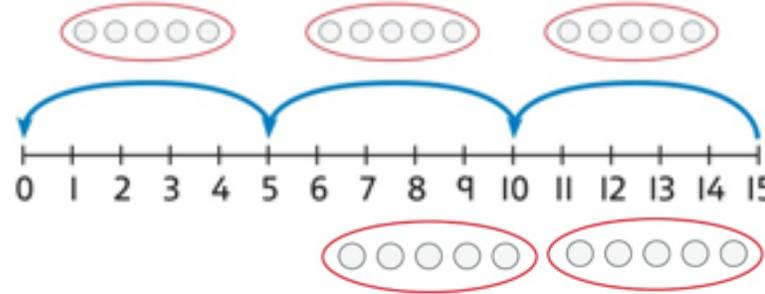
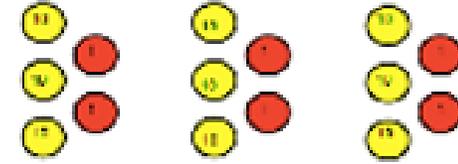
Concrete and pictorial representations



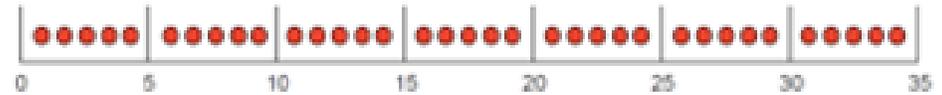
$$6 \div 2 = 3$$



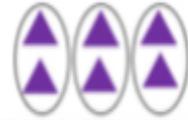
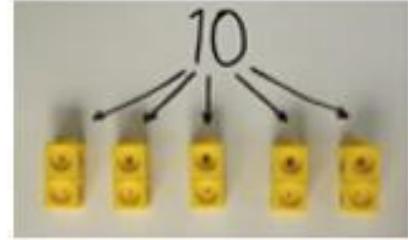
Grouping



There are 10 in total.
There are 5 in each group.
There are 2 groups.

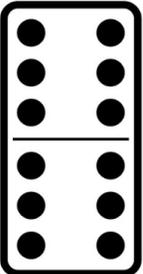
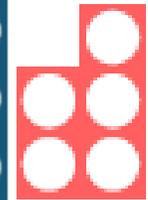
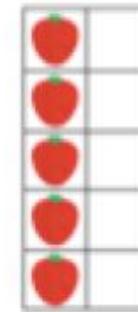
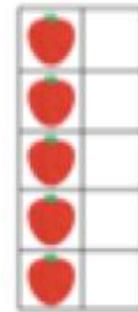


Real life contexts



There are ___ altogether.
There are ___ equal groups of ___

Halving



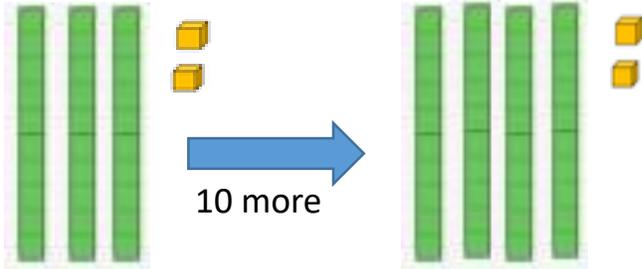
Year 2

Key Vocabulary			
Number	Geometry	Statistics	Measurement
tens, ones, hundreds , place value grid, partition, numeral, more, fewer, fewest, greatest, smallest, greater than, less than, fact family, number sentence, number bond, column, 10 more, 10 less, bar model, represent, exchange , difference, subtract, tens, ones, total, equal groups, share, group, multiply, multiplication, times-table, times, divide, division, odd, even , fraction, half, halves, quarter, parts of a whole, equal parts, whole, third, numerator, denominator, fraction bar, non-unit fraction, unit fraction, equal, three quarters	3D shape, cube, cuboid, sphere, pyramid, cylinder, cone, 2D shape, circle, triangle, rectangle, face, edge, vertex, vertices, pattern, repeated, quadrilateral, polygon, prism, hexagon, octagon, hemisphere, symmetry, line of symmetry, symmetrical, curved surface, anticlockwise, clockwise , turn, half turn, quarter turn, three quarter turn, whole turn, left, right, forwards, backwards, middle, forwards, backwards	table, block diagram, tally chart, pictogram, key	length, centimetre, metre , longer, shorter, metre stick , height, width , compare, distance, pound, pence, coin, note, change, £, mass , balance, weighing scales, capacity, estimate, approximation, gram, kilogram, litre, millilitre, volume, temperature, thermometer, degrees Celsius, heavier than, lighter than, hundreds, o'clock, half past, minute hand, hour hand, duration, quarter past, quarter to

Addition

2 digit number + multiple of 10

What's the same? What's different?

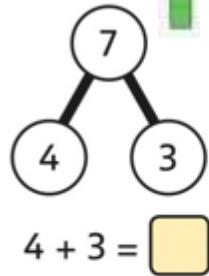


Tens 10s	Ones 1s

$$43 + 20 = 63$$

Key skills:
 2 digit number + 1 digit number
 2 digit number + multiple of 10

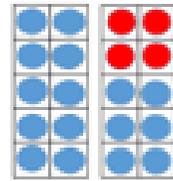
2 digit number + 1 digit number
 Use numbers in a context



$$4 + 3 = 7$$

$$4 \text{ tens} + 3 \text{ tens} = 7$$

$$40 + 30 = 70$$



16

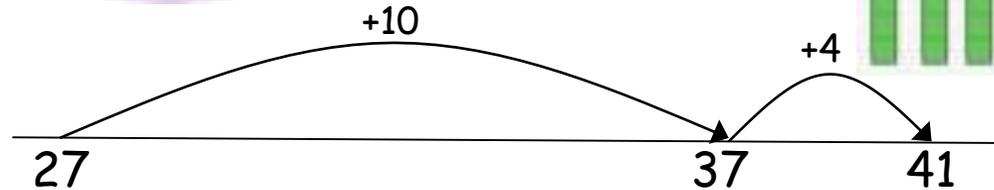
+



5

$$16 + 4 + 1 = 21$$

At **first** Fiona had saved £34 and **then** she added her £3 pocket money to that. How much does she have **now**?



2 digit number + 2 digit number

$$27 + 14$$

$$27 + 10 + 4$$

$$37 + 4 = 41$$

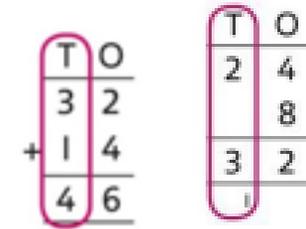
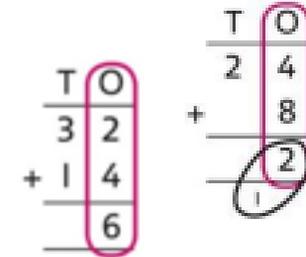
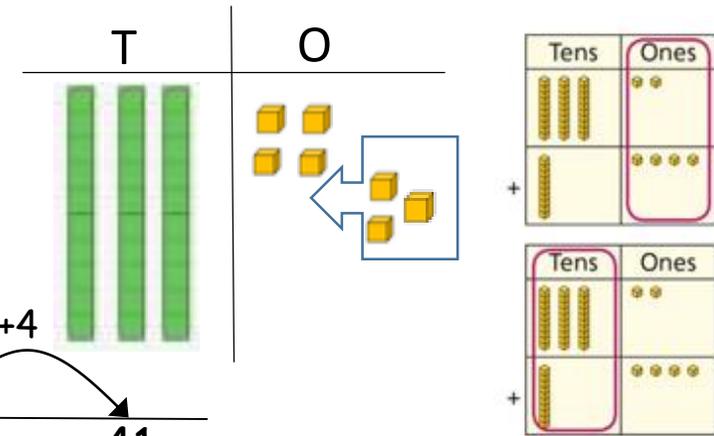
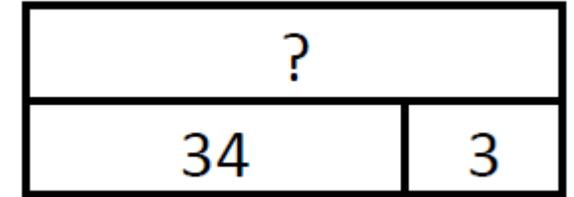
Keep the first number whole

T	O
20	7
+ 10	4
<hr/>	
30	11
= 41	

Tens 10s	Ones 1s

What does each number represent?

Children to use bar model



Teacher to use columnar methods with addition that do not cross the tens boundary in summer term using concrete resources to support.

Subtraction

2 digit number – 1 digit number
Use numbers in context

What does each number represent?

£24 - 5 = 19

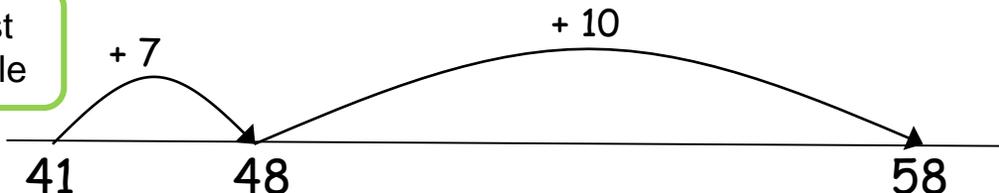
At **first** Fiona had saved £34 and **then** she spent £5. How much does she have **now**?

$$\begin{array}{r} 24 \\ - 5 \\ \hline 19 \end{array}$$

2 digit number - 2 digit number

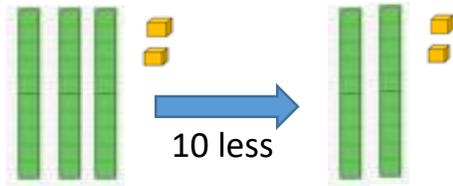
$$\begin{array}{r} 58 - 17 \\ 58 - 10 = 48 \\ 48 - 7 = 41 \end{array}$$

Keep the first number whole



2 digit number + multiple of 10

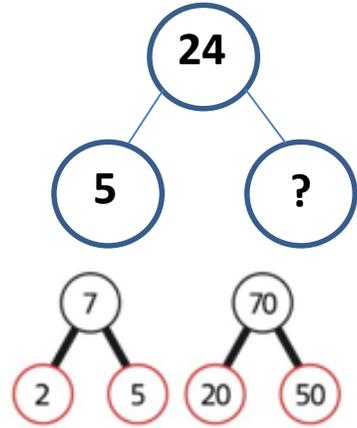
What's the same? What's different?



Tens 10s	Ones 1s
10, 10, 10, 10	1, 1, 1
$43 - 20 = 23$	

Summer term

$\begin{array}{r} T O \\ 4 5 \\ - 1 2 \\ \hline 3 3 \end{array}$	Exchange 1 ten for 10 ones.	Exchange 1 ten for 10 ones.
$\begin{array}{r} T O \\ 4 5 \\ - 1 2 \\ \hline 3 3 \end{array}$		
$\begin{array}{r} T O \\ 4 5 \\ - 1 2 \\ \hline 3 3 \end{array}$		$\begin{array}{r} T O \\ 4 5 \\ - 1 2 \\ \hline 3 3 \end{array}$



7 tens subtract 5 tens is 2 tens.
 $70 - 50 = 20$

Children to use the part whole and bar model

T	O
24	
19	?

Teacher to use columnar methods that do not cross the tens boundary in autumn term using concrete resources to support.

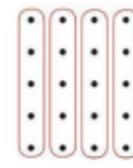
T	O
50	8
- 10	7
<hr/>	
40 + 1	= 41

Tens 10s	Ones 1s
10, 10, 10	1, 1, 1
10, 10	1, 1, 1
	1, 1

Key skills:
2 digit number - 1 digit number
2 digit number - multiple of 10

Multiplication

Commutativity

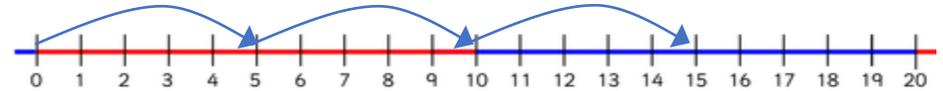


Link the 5x and 10x table through doubling and halving.

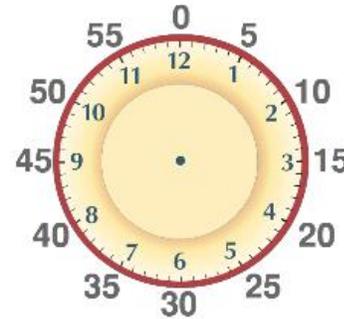
$$4 + 4 + 4 + 4 + 4 = 20$$

$$5 + 5 + 5 + 5 = 20$$

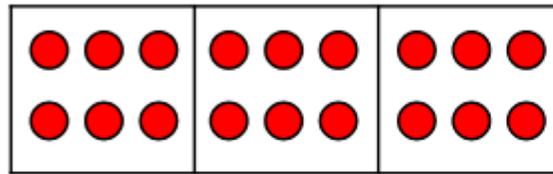
$$4 \times 5 = 20 \text{ and } 5 \times 4 = 20$$



Link the 5x table to intervals on a clock face.



Solve problems



$$\underline{\quad} + \underline{\quad} + \underline{\quad} = 18$$

$$\underline{\quad} \times \underline{\quad} = 18$$

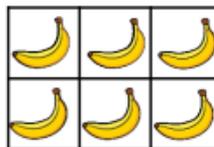
Each bag holds 5 apples. How many apples are there in 3 bags?



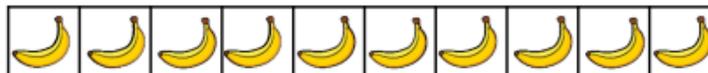
Anna has 7 pies. She cuts each pie into 10 slices. How many slices of pie are there in total?



A bicycle has 2 wheels. How many wheels do 3 bicycles have?



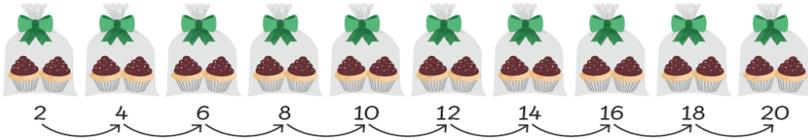
$$2 \times 3 \quad \text{and} \quad \underline{\quad} \times \underline{\quad}$$



$$\underline{\quad} \times \underline{\quad} \quad \text{and} \quad \underline{\quad} \times \underline{\quad}$$

Use a range of resources and methods before moving to the abstract form.

Count in twos.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

There are 20 cupcakes altogether.

What number pattern do you see on the number chart?



Consolidate repeated addition and link to multiplication



How many cupcakes are there altogether?

$4 \times 3 = 12$ is read as 4 times 3 equals 12.

There are 4 groups. Each group has 3 cupcakes.



$$3 + 3 + 3 + 3 = 12$$

$$4 \text{ threes} = 12$$

$$4 \text{ groups of } 3 = 12$$

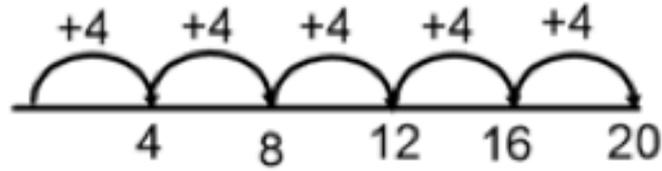
$$4 \times 3 = 12$$

There are 12 cupcakes altogether.

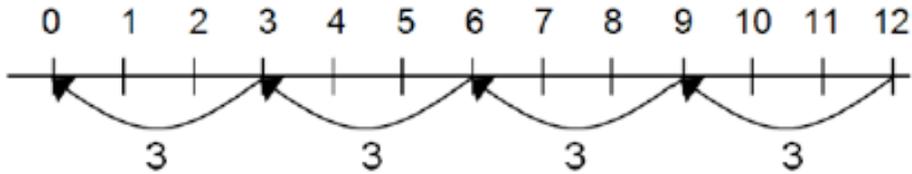
Division

Concrete and pictorial representations

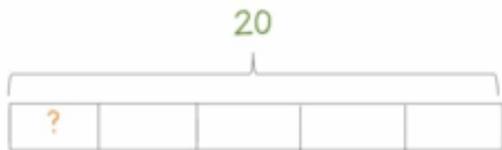
Grouping



Use a number line to show jumps in groups. The number of jumps equals the number of groups.



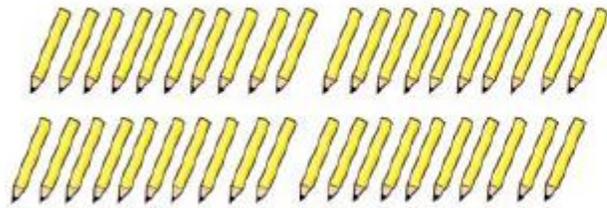
Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.



$$20 \div 5 = ?$$

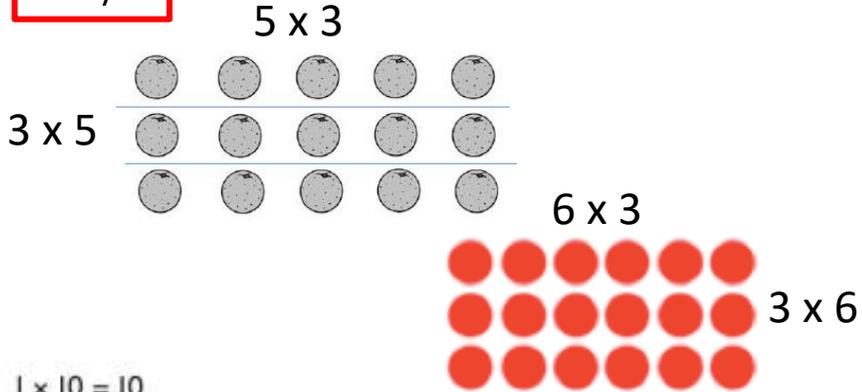
$$5 \times ? = 20$$

Sharing



$$\square \div \square = \square$$

Arrays



- 1 x 10 = 10
- 2 x 10 = 20
- 3 x 10 = 30
- 4 x 10 = 40
- 5 x 10 = 50
- 6 x 10 = 60
- 7 x 10 = 70
- 8 x 10 = 80

I used the 10 times-table to help me.
3 x 10 = 30.

Missing number problems

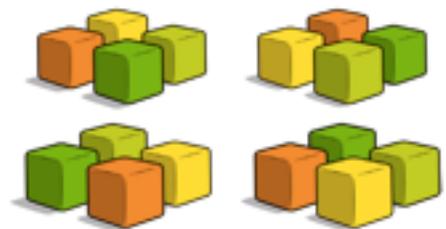
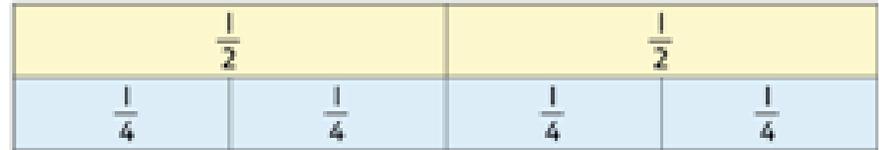
$$70 \div 10 = \square$$

$$6 \text{ tens} \div 1 \text{ ten} = \square$$

$$5 = \square \div 10$$

There are \square tens in 40

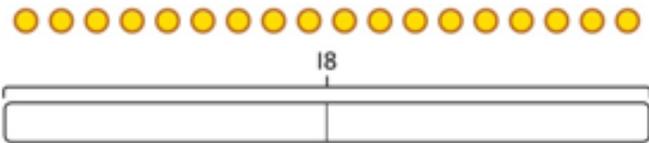
Link division to fractions



Begin to find half or a quarter if a quantity using sharing.

I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.

Use a bar model to support understanding of the division.



$$18 \div 2 = 9$$

Year 3

Key Vocabulary			
Number	Geometry	Statistics	Measurement
<p>thousands, hundreds, tens, ones, place value, more, less, greater than, less than, equal to, order, compare, estimate, exchange, addition, subtraction, mental method, column method, exchange, estimate, approximate, multiple, digit, equal, multiply, divide, times-table, sharing, grouping, array, bar model, remainder, repeated addition, multiplication sentence, division statement, division fact, compare, more than, less than, greater than, equals, equally, least, most, share, partition, multi-step, equal parts, whole, unit fraction, equation, integer, non-unit fraction, numerator, denominator, represent, share, group, mixed number, whole number, divide, set of objects, multiply, tenth, interval, equivalent, equivalent fraction, compare, add, subtract, fraction, whole, greater than, less than, equal to, divide, difference, inequality statement</p>	<p>right angle, obtuse, acute, parallel, perpendicular, vertical, horizontal, triangle, quadrilateral, kite, trapezium, rhombus, parallelogram, cuboid, triangular prism, square-based pyramid, cone cylinder, edge, face, vertices, clockwise, anticlockwise</p>	<p>pictogram, key, bar chart, scale, vertical axis, horizontal axis, table, row, column</p>	<p>length, height, width, perimeter, distance, centimetre, millimetre, metre, unit of measurement, measure, add, subtract, multiply, equivalent, convert, greater than, less than, ruler, metre stick, pound, pence, convert, total, difference, change, mass, weight, measure, scale, interval, gram, kilogram, capacity, litre, millilitre, convert, month, year, midnight, midday, am, pm, duration, estimate, consecutive, hour, minute, second, past, to, start, end, digital clock, analogue clock</p>

Addition

3 digit number + 1 digit number

Teacher to use columnar methods with addition using concrete resources to support.

3 digit number + 2 digit number

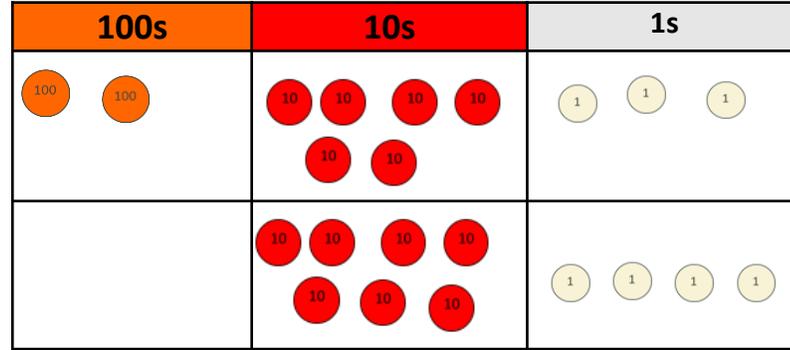
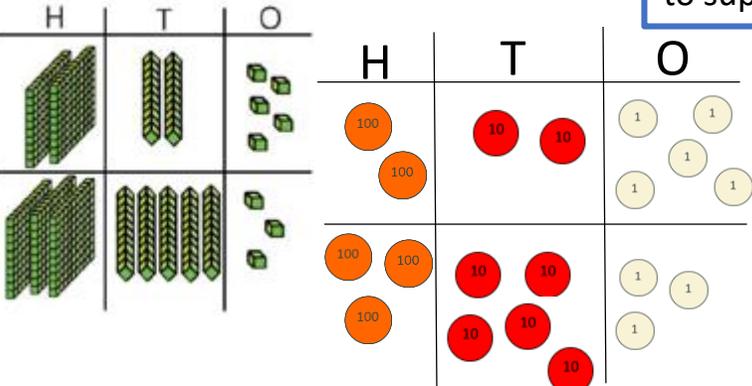
Key skills prior to this stage :
 2 digit number + 1 digit number
 2 digit number + multiple of 10
 Column method using concrete and pictorial

3 digit number + 3 digit number

$$473 + 359 =$$

H	T	O
400	70	3
300	50	9
<hr/>		
700	120	12
<hr/>		
832		

HTO
 473
 + 359
 12
 120
 700
 832



$$263 + 74 =$$

H	T	O
200	60	3
	70	4
<hr/>		
200	130	7
<hr/>		
337		

HTO
 263
 + 74
 7
 130
 200
 337

Teacher to use the compact method once columnar method is secure.

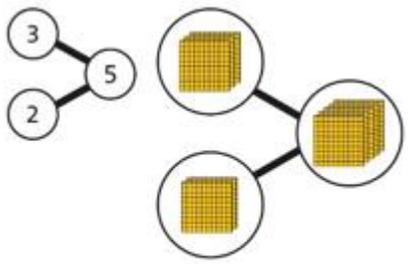
Mental strategies based on experiences using concrete and pictorial representation previously:

$$143 + 9 = 143 + 7 + 2 = 150 + 2 = 152$$

$$276 + 35 = 276 + 30 + 5 = 306 + 5 = 310 + 1 = 311$$

$$165 + 305 = 305 + 100 + 60 + 5 = 405 + 60 + 5 = 465 + 5 = 470$$

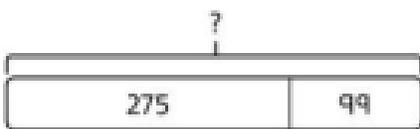
Use part whole to support unitising



$$3 + 2 = 5$$

$$300 + 200 = 500$$

Children to use bar model

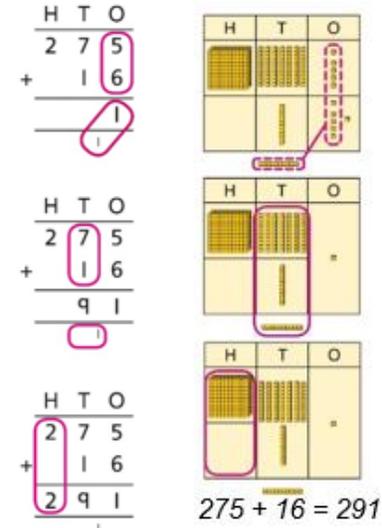
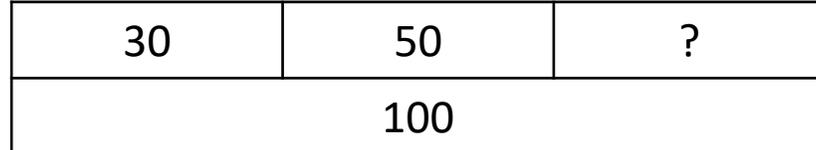


Solve missing box problems

$$58 + 17 = 75$$

$$8 \square + \square 4 = 155$$

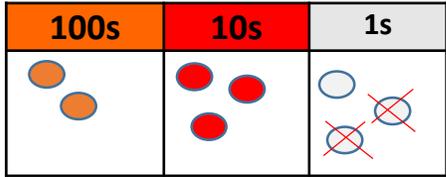
$$128 + 105 = 233$$



$$275 + 16 = 291$$

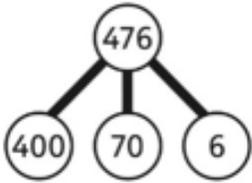
Subtraction

3 digit number + 1 digit number



$$233 - 2 = 231$$

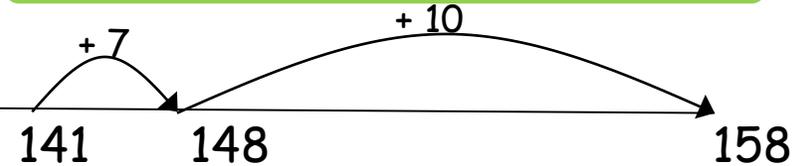
$$476 - 4 = ?$$



$$6 - 4 = 2$$

$$476 - 4 = 472$$

Finding the difference using a number line



H	T	O	
300	50	8	
-	10	7	
<hr/>			
300	40	1	= 341

3 digit number + 2 digit number

Subtraction is not commutative

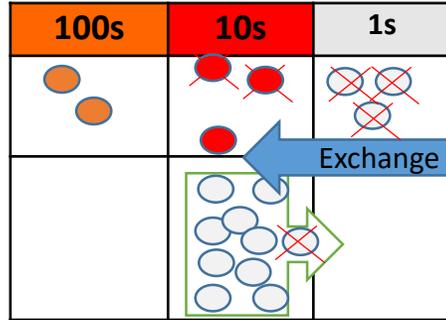
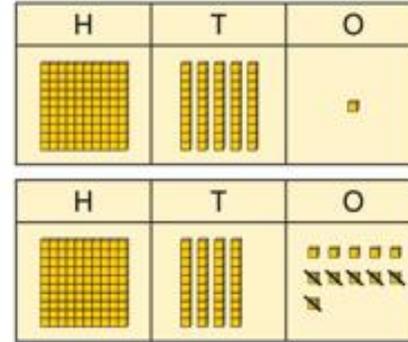
Key skills prior to this stage :

2 digit number - 1 digit number

2 digit number - multiple of 10

Column method using concrete and pictorial

$$151 - 6 = ?$$



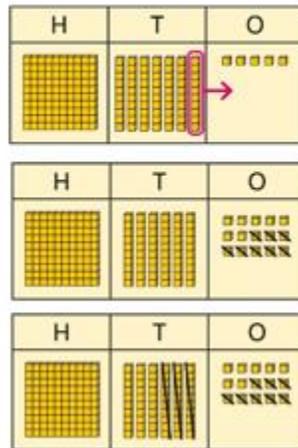
Exchange 1 ten for 10 ones

$$233 - 24 = 209$$

3 digit number + 3 digit number

$$175 - 38 = ?$$

I need to subtract 8 ones, so I will exchange a ten for 10 ones.



H	T	O	
300	50	8	
-	200	10	7
<hr/>			
100	40	1	= 141

H	T	O	
	30	11	
300	40	1	
-	100	20	3
<hr/>			
200	10	8	= 218

Teacher to use the compact method once columnar method is secure.

H	T	O
1	7	5
-	3	8
<hr/>		
1	3	7

$175 - 38 = 137$

Mental strategies based on experiences using concrete and pictorial representation previously:

Count on/find the difference

If the numbers are close together

$$203 - 199 =$$

$$199 + \underline{\quad} = 203$$

Round and adjust

If subtracting a 'near tens' number

$$64 - 19 =$$

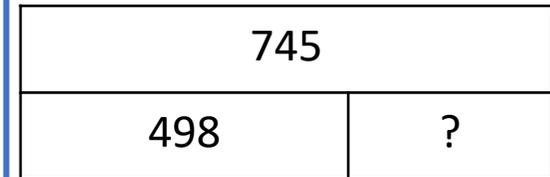
$$64 - 20 = 44 + 1 = 45$$

Count back

If subtracting a single digit or multiple of 10

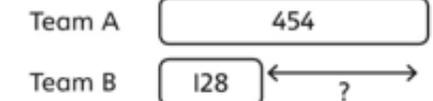
$$342 - 5 = \text{ or } 257 - 40 =$$

Bar model



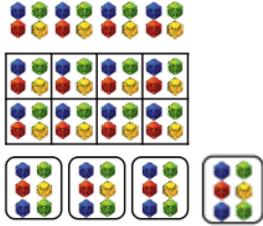
Use bar models to represent subtractions.

'Find the difference' is represented as two bars for comparison.



Multiplication

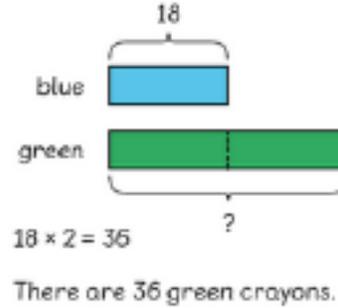
2 digit number x 1 digit number
concrete and pictorial



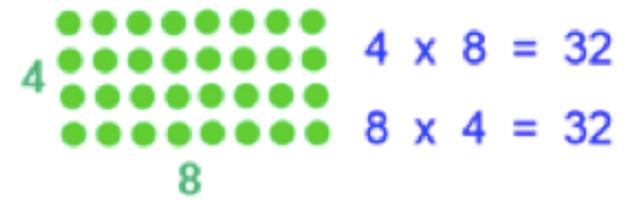
- 8×4
- 4×4
- 4×6

Solve problems

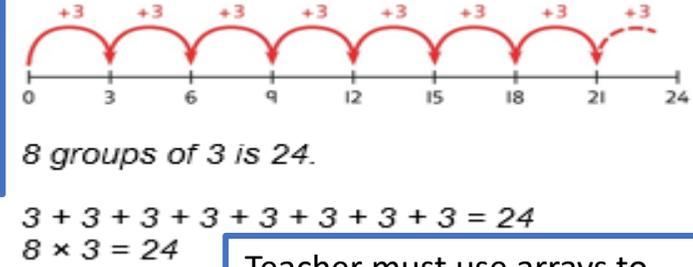
Continue to use CPA approach and bar model when solving multiplication and division problems.



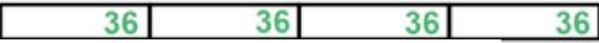
Commutativity



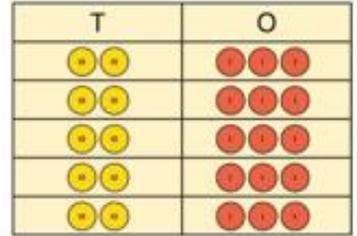
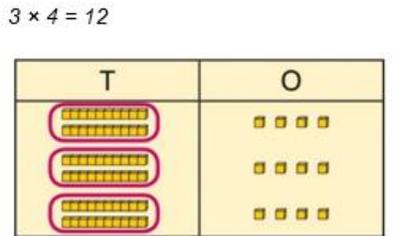
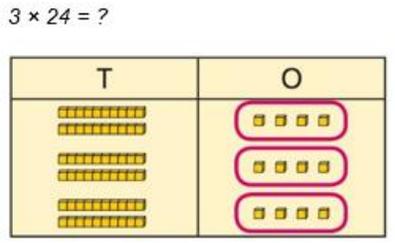
To continues to make links between repeated addition and multiplication.



Teacher must use arrays to introduce the grid method.

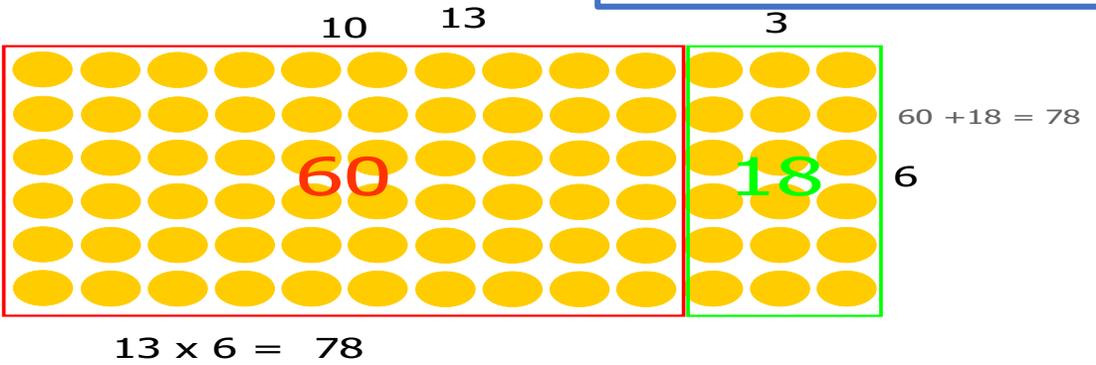
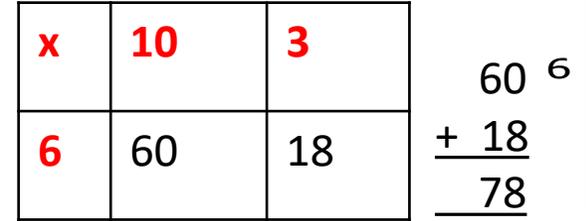


HORIZONTAL PARTITIONING
 36×4
 $6 \times 4 = 24$
 $30 \times 4 = 120$
144



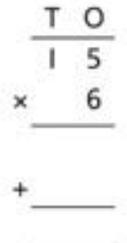
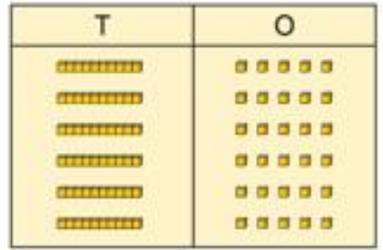
$5 \times 23 = ?$
 $5 \times 3 = 15$
 $5 \times 20 = 100$
 $5 \times 23 = 115$

2 digit number x 1 digit number
pictorial and abstract

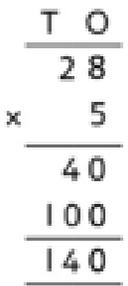


By the end of Year 3 all children should be familiar with using the grid method to multiply 2 digit number by 1 digit number. Only introduce the expanded method when children are secure.

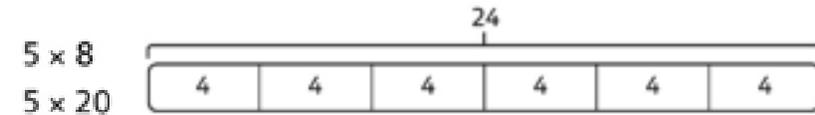
- $3 \times 20 = 60$
- $60 + 12 = 72$
- $3 \times 24 = 72$



6×5
 6×10



A bar model may represent multiplications as equal groups.

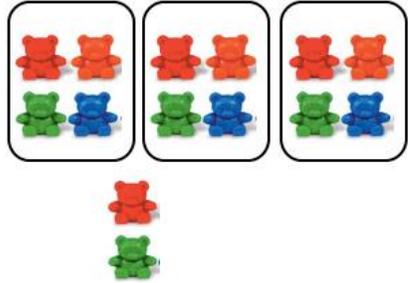


$6 \times 4 = 24$

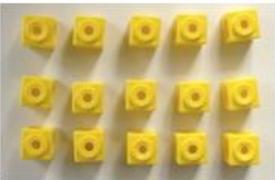
Division

$14 \div 3 =$

Divide objects between groups and see how much is left over



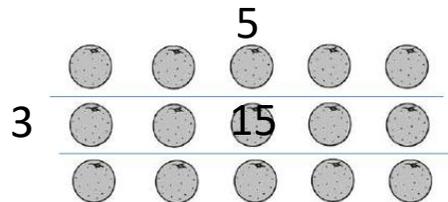
Related multiplication and division facts



Link division to multiplication by creating an array and thinking about the number sentences that can be created.

Eg $15 \div 3 = 5$ $5 \times 3 = 15$
 $15 \div 5 = 3$ $3 \times 5 = 15$

Arrays

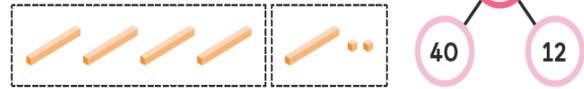


Concrete and pictorial representations

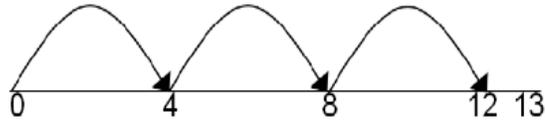
To find the number of ice creams in each box, divide 52 by 4.

$52 \div 4 =$

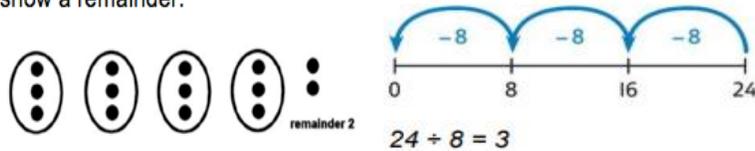
Step 1 Split 52 into 40 and 12.



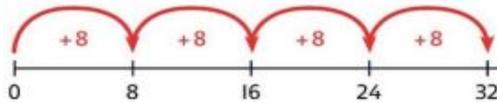
Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



Draw dots and group them to divide an amount and clearly show a remainder.

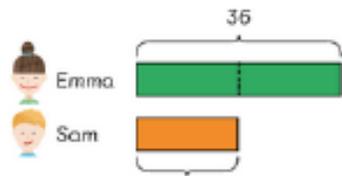


$24 \div 8 = 3$



$32 \div 8 = 4$

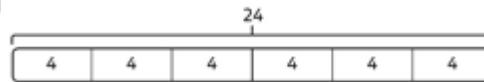
Use bar model



$36 \div 2 = 18$

Sam has 18 beads.

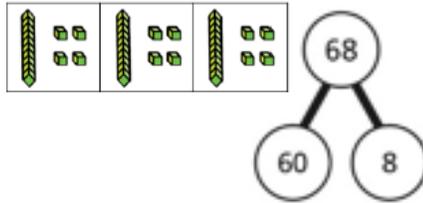
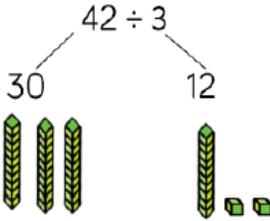
A bar model may represent the relationship between sharing and grouping.



$24 \div 4 = 6$

$24 \div 6 = 4$

Divide by partitioning



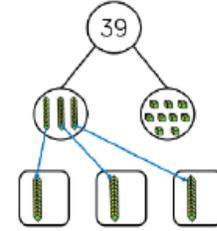
$60 \div 2 = 30$

$8 \div 2 = 4$

$+ 4 = 34$

$\div 2 = 34$

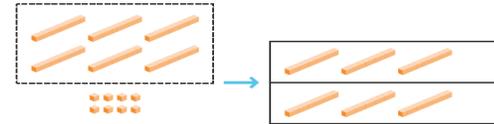
Step 1: Share the tens



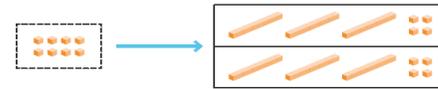
To find the number of sweets each person gets, divide 68 by 2.

$68 \div 2 =$

Step 1 Divide 6 tens by 2.



Step 2 Divide 8 ones by 2.

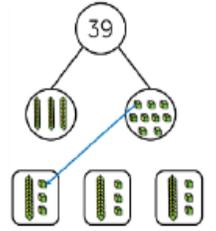


Step 3 Add the results.

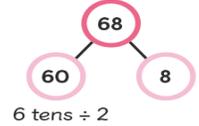
$68 \div 2 = 30 + 4 = 34$

Each person gets 34 sweets.

Step 2: Share the ones

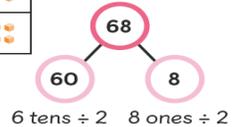


$6 \text{ tens} \div 2 = 3 \text{ tens}$



$6 \text{ tens} \div 2$

$8 \text{ ones} \div 2 = 4 \text{ ones}$



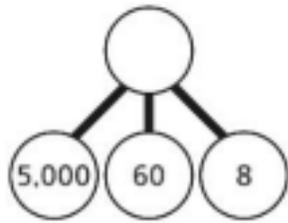
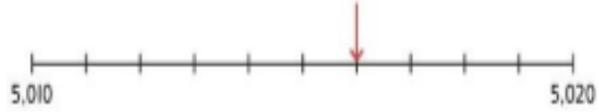
$6 \text{ tens} \div 2$ $8 \text{ ones} \div 2$

Step 1 Build the number and show the groups on the place value chart	Step 2 Share the tens	Step 3 Exchange the tens into ones and share the ones																																												
$94 \div 4 =$ 	$94 \div 4 =$ 	$94 \div 4 = 23 \text{ r } 2$ 																																												
<table border="1"> <thead> <tr> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	T	O									<table border="1"> <thead> <tr> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> </tbody> </table>	T	O	10	10	10	10	10	10	10	10	10	10	<table border="1"> <thead> <tr> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td></tr> </tbody> </table>	T	O	10	10	10	10	10	10	10	10	10	10	1	1	1	1	1	1	1	1	1	1
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Year 4

Key Vocabulary			
Number	Geometry	Statistics	Measurement
<p>thousands, hundreds, tens, ones, rounding, order, more than, less than, partition, numeral, nearest, distance, ascending, descending, negative, step, multiple, greater than, less than, addition, total, more than, subtraction, less than, column method, estimate, how much, strategy, efficient, accurate, exact, diagram, fact, multiply, divide, multiplication facts, division facts, lots of, groups of, times-table, array, partition, bar model, part-whole model, remainder, factor, factor pair, commutative, Tenths, hundredths, simplify, equivalent, numerator, denominator, fraction, mixed number, add, subtract, fractions of an amount, improper fraction, simplest fraction, , decimal point, greater than, equivalent, less than, decimal, 0.1, 0.01, whole number, equal order, compare, convert, decimal place, ascending, descending</p>	<p>quadrilateral, triangle, regular, irregular, interior angle, angle, acute, obtuse, reflect, right angle, symmetrical, isosceles, scalene, equilateral, line of symmetry, reflective symmetry, position, horizontal, vertical, up, down, left, right, coordinates, square, rectangle, plot, vertex, vertices, point, grid</p>	<p>data, line graph, pictogram, bar chart, table, altogether, more than, greatest, smallest, continuous data, compare</p>	<p>length, width, perimeter, distance, rectangle, square, centimetre, metre, around, rectilinear shape, kilometre, area, space, unit, least, greatest, triangle, quadrilateral, reflection, rotation, formula, notes, coins, pounds, pence, add, subtract, change, round to the nearest, order, greater than, less than, cheaper, more expensive, estimate, over estimate, under estimate, notation, total, convert, compare, unit of time, second, minute, hour, day, week, month, year, 12-hour, 24-hour, analogue, digital, am, pm</p>

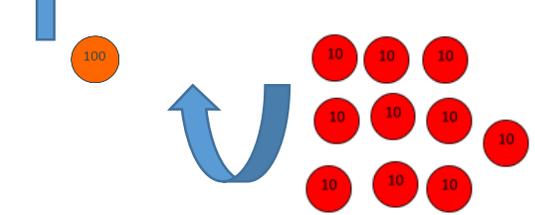
Addition



3 digit number + 3 digit number with exchanging

100s	10s	1s
100	10 10 10 10 10 10 10	1 1 1
100	10 10 10 10 10	1 1

100s	10s	1s
100	10 10	1 1 1
100		1 1



173 + 152 = 325

Teacher to use columnar methods with addition using concrete resources to support until children are secure before using compact method.

$$\begin{array}{r} 173 \\ + 152 \\ \hline 5 \\ 120 \\ \hline 300 \\ \hline 325 \end{array}$$

$$\begin{array}{r} 173 \\ + 152 \\ \hline 325 \\ 1 \end{array}$$

Key skills prior to this stage :
2 digit number + 1 digit number
2 digit number + multiple of 10
Column method

$$\begin{array}{r} 758 \\ + \blacksquare 15 \\ \hline 10\blacksquare 3 \end{array}$$

Solve missing box problems

4 digit number + 4 digit number with exchanging

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

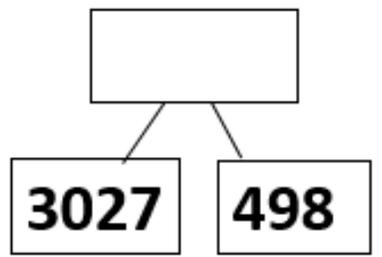
$$\begin{array}{r} \text{Th H T O} \\ 1 \ 5 \ 5 \ 4 \\ + 4 \ 2 \ 3 \ 7 \\ \hline \ 9 \ 1 \end{array}$$

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

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

315	
185	?

315 - 185 = ?
185 + ? = 315



?	
3027	498

Children to use part whole and bar model to develop estimation and number sense.

Bar models may be used to represent additions in problem contexts, and to justify mental methods where appropriate.

1,373	
799	574

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

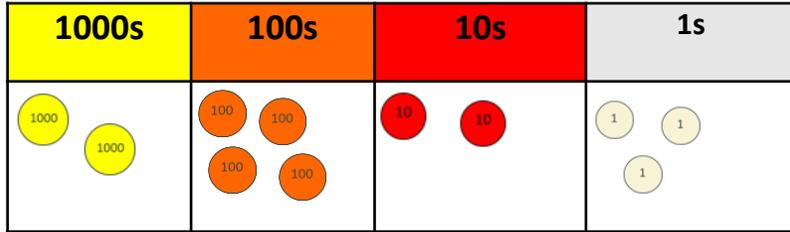
I chose to work out 574 + 800, then subtract 1.

6,000	
2,999	3,001

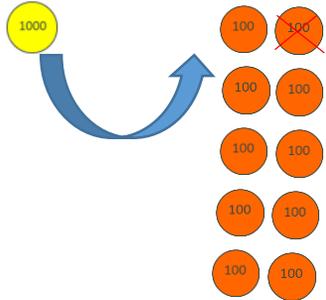
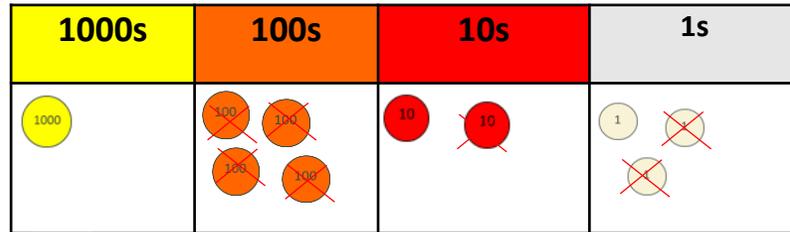
This is equivalent to 3,000 + 3,000.

Subtraction

4 digit number + 3 digit number with exchanging



$$2423 - 512 = 1911$$



A baker made 2750 chocolate cookies and 1638 vanilla cookies. He sold 3198 cookies altogether. How many cookies did he have left?

Teacher to use columnar methods with addition using concrete resources to support until children are secure before using compact method.

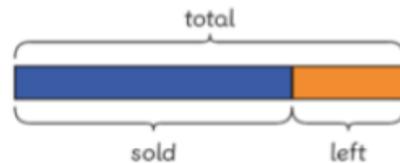
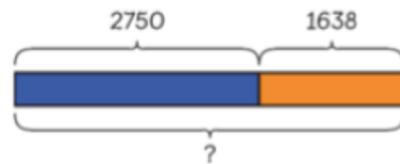
TH	H	T	O	
1000	1400			
2000	400	20	3	
1000	900	10	1	= 1911

Th	H	T	O
1	2	5	0
4	2	0	0

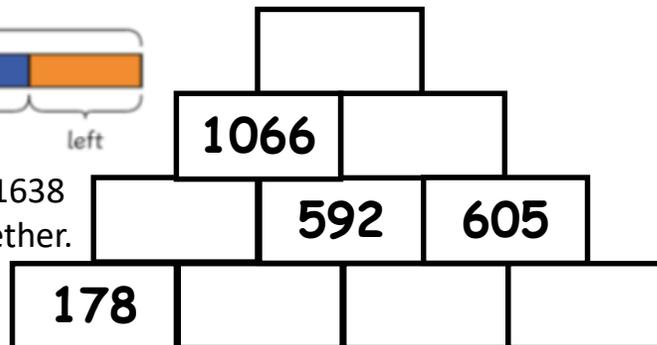
Th	H	T	O
1	2	5	0
4	2	0	0
3	0	0	0

Th	H	T	O
1	2	5	0
4	2	0	0
8	3	0	0

Th	H	T	O
1	2	5	0
4	2	0	0
8	3	0	0

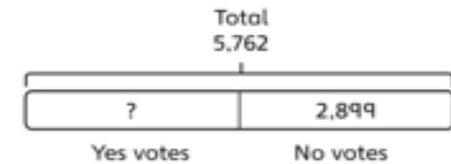
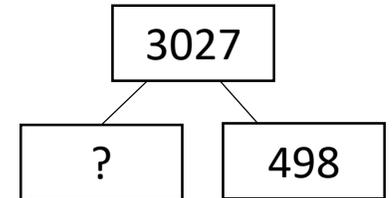
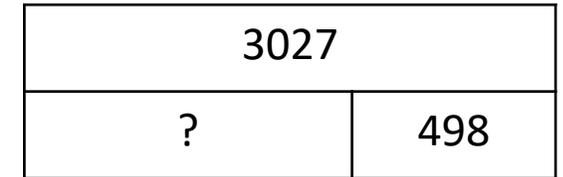


Problem solving



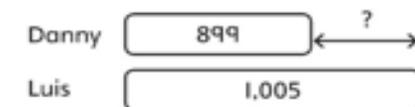
Key skills prior to this stage :
2 digit number - 1 digit number
2 digit number - multiple of 10
Column method

Children to use part whole and bar model to develop estimation and number sense.



I can work out the total number of Yes votes using $5,762 - 2,899$.

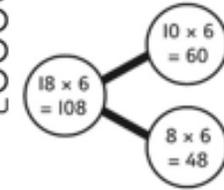
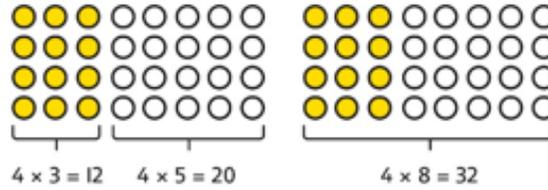
Bar models can also represent 'find the difference' as a subtraction problem.



Multiplication

Efficient multiplication

$18 \times 6 = ?$



$$18 \times 6 = 10 \times 6 + 8 \times 6$$

$$= 60 + 48$$

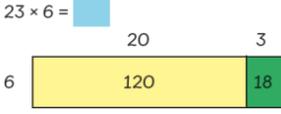
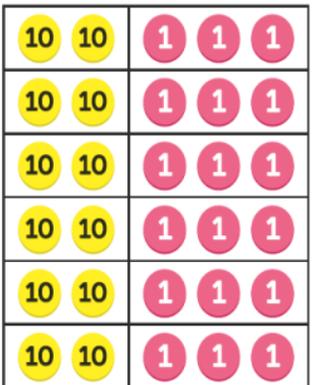
$$= 108$$



$$15 \times 6$$

$$= 3 \times 5 \times 6$$

$6 \times 23 = \square$



$23 \times 6 = 120 + 18 = 138$

$4 \times 3 = 12$
 $4 \times 5 = 20$
 $12 + 20 = 32$
 $4 \times 8 = 32$

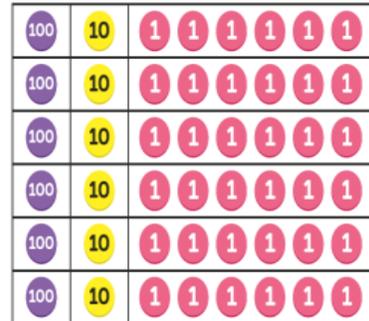
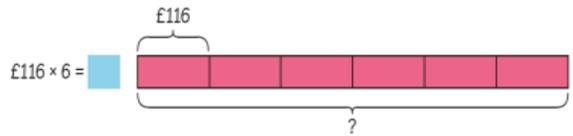
$18 \times 6 = 10 \times 6 + 8 \times 6$
 $= 60 + 48$
 $= 108$

2 digit number or 3 digit number x 1 digit number

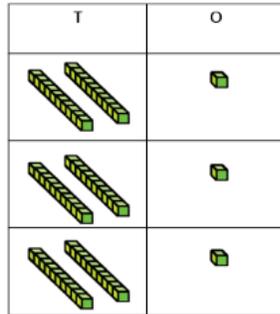
x	40	3
8	320	24

Teacher to teach grid method in the Autumn term.

2 digit number or 3 digit number x 1 digit number continue to use CPA approach



$100 \times 6 = 600$
 $10 \times 6 = 60$
 $6 \times 6 = 36$
 $116 \times 6 = 696$



	T	O			
x	2	1			
			3		
				(3 x 1)	
+	6	0		(3 x 20)	
	6	3			

$12 \times 2 \times 5 =$
 $12 \times 10 = 120$
 So, $24 \times 5 = 120$

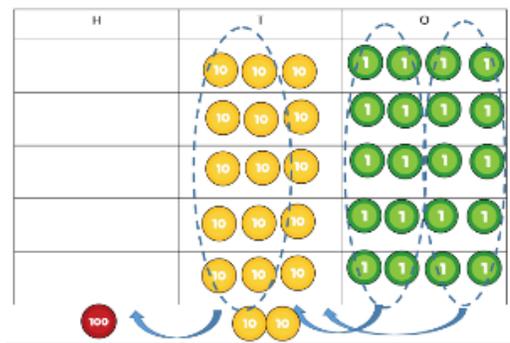
Teacher to model the expanded method alongside the grid method to illustrate the link between.

$$\begin{array}{r} 43 \\ \times 8 \\ \hline 24 \quad (3 \times 8) \\ 320 \quad (40 \times 8) \\ \hline 344 \end{array}$$

Teacher to ensure children are secure in multiplying a 2 digit number by a 1 digit number, before moving onto 3 digit numbers.

$100 \times 6 \quad 10 \times 6 \quad 6 \times 6$

The tickets cost £696.



	3	4			
x	5				
			(5 x 4)		
	2	0			
	1	5	0	(5 x 30)	

x	100	30	6
5	500	150	30

$$\begin{array}{r} 136 \\ \times 5 \\ \hline 30 \quad (6 \times 5) \\ 150 \quad (30 \times 5) \\ 500 \quad (100 \times 5) \\ \hline 680 \end{array}$$

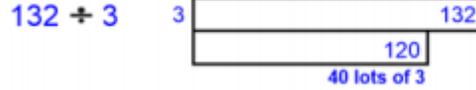
Division

Use table facts with which the children are fluent.

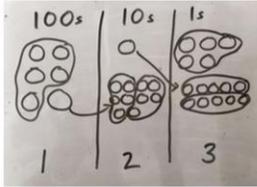
Concrete and pictorial representations

Divide 3 digit number by 1 digit number- no remainder

Bar model

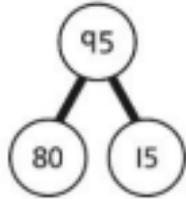


$615 \div 5$



$$\begin{array}{r} 123 \\ 5 \overline{) 615} \\ \underline{5} \\ 11 \\ \underline{10} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

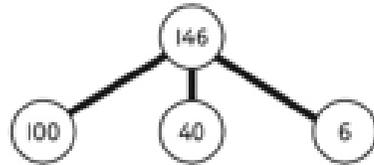
Division using partitioning



$$\begin{aligned} 80 \div 4 &= 20 \\ 12 \div 4 &= 3 \end{aligned}$$

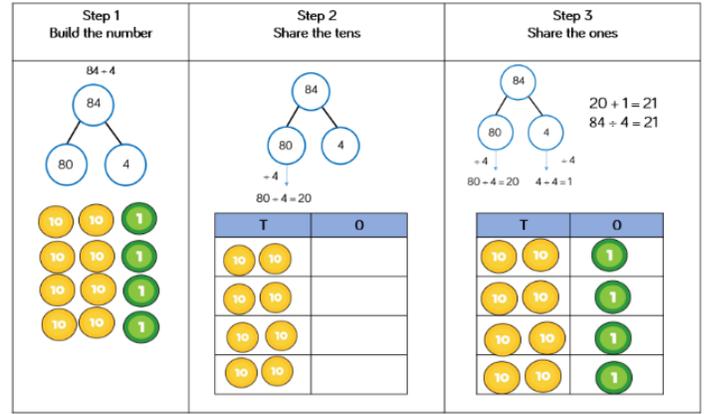
$95 \div 4 = 23 \text{ remainder } 3$

$142 \div 2 = ?$

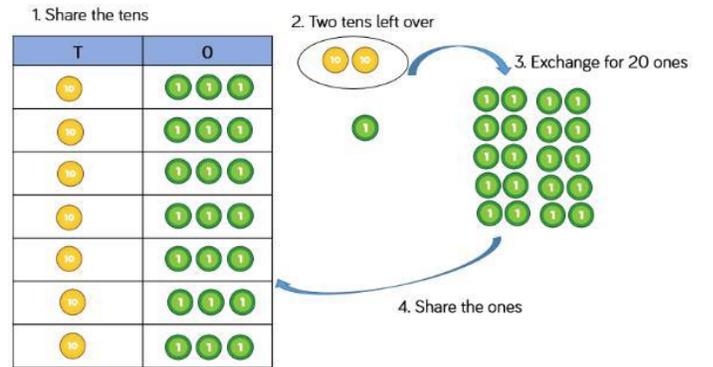


$100 \div 2 = \square \quad 40 \div 2 = \square \quad 6 \div 2 = \square$

$$\begin{aligned} 100 \div 2 &= 50 \\ 40 \div 2 &= 20 \\ 6 \div 2 &= 3 \\ 50 + 20 + 3 &= 73 \\ 142 \div 2 &= 73 \end{aligned}$$



$91 \div 7 = 13$

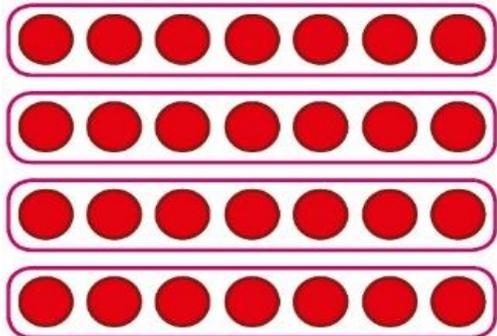


Divide 3 digit number by 1 digit number- with remainder

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{20} \\ 23 \\ \underline{21} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

$$\begin{array}{r} 36 \text{ r } 5 \\ 7 \overline{) 254} \\ \underline{21} \\ 44 \\ \underline{42} \\ 20 \\ \underline{14} \\ 6 \end{array}$$

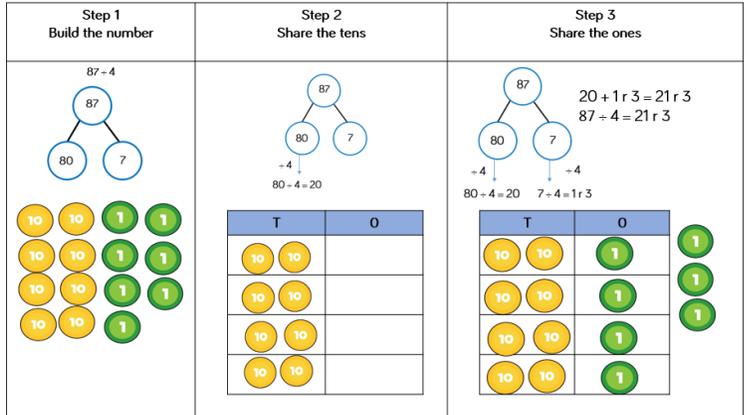
Division using arrays



$28 \div 7 = 4$

Division and fractions

$1/6 \text{ of } \dots \text{ and } \div 6 \quad 126 \div 6 = 21$



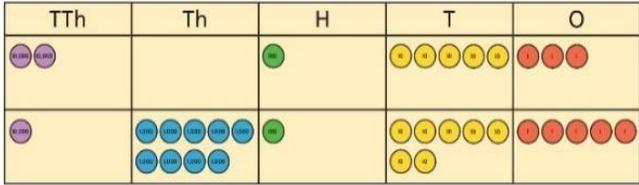
Year 5

Key Vocabulary

Number	Geometry	Statistics	Measurement
<p>ones, tens, hundred, thousands, ten thousands, hundred thousands, million, sequence, place value, partition, estimate, round, compare, order, equivalent, greater than, less than, convert, add, subtract, ones, tens, hundreds, thousands, ten thousands, mentally, inverse, round, estimate, distance chart, prime number, composition number, square number, cube number, inverse operation, factor prime factor, multiply, divide, multiple, place value, partition, equal, remainder, total, equivalent, numerator, denominator, whole, fraction, simplify, expand, division, improper, mixed number, convert, sequence, order, greater than, less than, equal to, proper fraction, improper fraction, efficient, common denominator, equal parts, divide, multiply, fractions of an amount, operator, decimal, decimal place, tenth, hundredths, thousandths, decimal point, place value, digit, fraction, add, subtract, multiply, divide, whole, column, exchange, per cent, percentages</p>	<p>angle, whole turn, right angle, acute angle, obtuse angle, reflex angle, degree, interior angle, orientation, clockwise, anticlockwise, parallel, perpendicular, angle, quadrilateral, view, regular, irregular, 3D shape, pyramid, sphere, cone, hexagon, pentagon, triangle, top view, plan view, side view, reflection, translation, vertex, vertices, coordinates, mirror line, horizontal axis, vertical axis</p>	<p>graph, line graph, table, dual line graph, horizontal, vertical, two-way table, scale, axis/axes, data, plot/plotted, tallies/tally, digit</p>	<p>perimeter, distance, area, space, length, width, centimetre, square centimetre, metre, square metre, scale, compare, estimate, formula, 2d shape, brackets, convert, metric unit, imperial unit, kilo, kilogram, gram, millimetre, centimetre, metre, kilometre, litre, millilitre, pound, ounce, inch, foot, yard, pint, gallon, stone, approximately, volume, cube, cuboid, 3D shape, solid, capacity, calculate, estimate, unit cube, least, greatest</p>

Addition

Adding numbers with more than 4 digits



$$\begin{array}{r}
 \text{TTh} \text{ Th} \text{ H} \text{ T} \text{ O} \\
 2 \ 0 \ 1 \ 5 \ 3 \\
 + 1 \ 9 \ 1 \ 7 \ 5 \\
 \hline
 3 \ 9 \ 3 \ 2 \ 8 \\
 \hline
 \end{array}
 \quad + \quad
 \begin{array}{r}
 7648 \\
 1486 \\
 \hline
 9134 \\
 111 \\
 \hline
 \end{array}
 \quad + \quad
 \begin{array}{r}
 17289 \\
 5145 \\
 \hline
 22434 \\
 1 \ 11 \\
 \hline
 \end{array}$$

Problem Solving

Sam and Amy are playing their favourite computer game. Amy's current high score is 8,453.

Sam's high score is bigger than Amy's and when you add them together their combined total is 19,384. What is Matthew's high score?

?	
375.5	14.3

- Vary the number of digit in the number.

$$65 + 577 =$$

- Add more than two numbers together.

$$1254 + 345 + 12,698 =$$

- Write = sign in different positions.

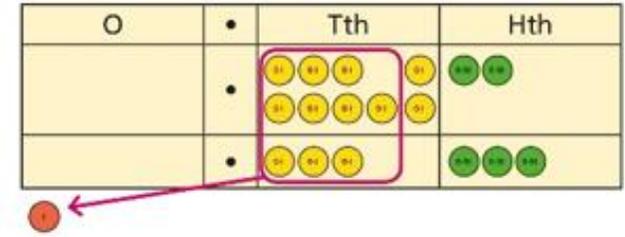
$$? = 4277 + 656$$

- Balanced equations.

$$648 + ? = 1036 + 58$$

Decimal numbers

$$\begin{array}{r}
 57.30 \\
 + 6.08 \\
 \hline
 63.38 \\
 1
 \end{array}$$

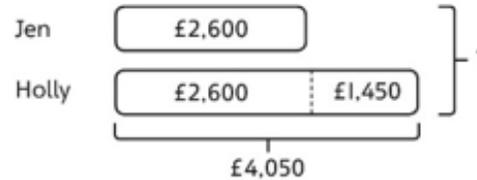
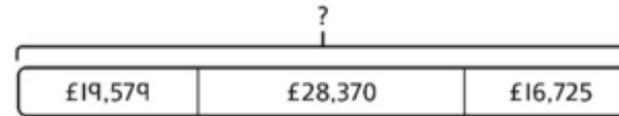


$$\begin{array}{r}
 \text{O} \cdot \text{Tth} \text{ Hth} \\
 0 \cdot 9 \ 2 \\
 + 0 \cdot 3 \ 3 \\
 \hline
 1 \cdot 2 \ 5 \\
 \hline
 \end{array}$$



$$\begin{array}{r}
 \text{O} \cdot \text{Tth} \text{ Hth} \\
 5 \cdot 0 \ 0 \\
 + 1 \cdot 2 \ 5 \\
 \hline
 6 \cdot 2 \ 5 \\
 \hline
 \end{array}$$

Pupils to use part whole and bar model to develop estimation and number sense.



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

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

Solve missing box problems

$$\begin{array}{r}
 \square 4 \square 3 \square \\
 + 2 \square 5 \square 2 \\
 \hline
 78529
 \end{array}$$

Subtraction

Subtract numbers with more than 4 digits

$$\begin{array}{r} 3416315 \\ - 2716 \\ \hline 1919 \end{array}$$

$$\begin{array}{r} 58991021 \\ - 43891 \\ \hline 15130 \end{array}$$

Decimal numbers



Exchange 1 tenth for 10 hundredths.



Now subtract the 5 hundredths.



Now subtract the 2 tenths, then the 2 ones.



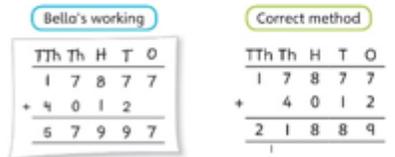
$$\begin{array}{r} 57.2310 \\ - 6.08 \\ \hline 51.22 \end{array}$$

$$\begin{array}{r} 671.8 \\ - 34.5 \\ \hline 37.3 \end{array}$$

- Vary the number of digit in the number.
 $13,065 - 577 =$
- Subtract more than two numbers.
 $163,254 - 345 - 12,698 =$
- Write = sign in different positions.
 $? = 4277 - 656$
- Balanced equations.
 $16,948 - ? = 11,036 - 158$

Address difficult points- zero as a place holder

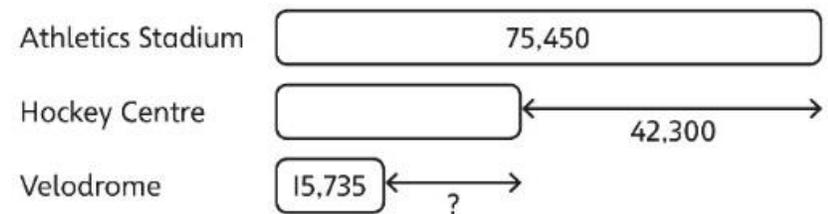
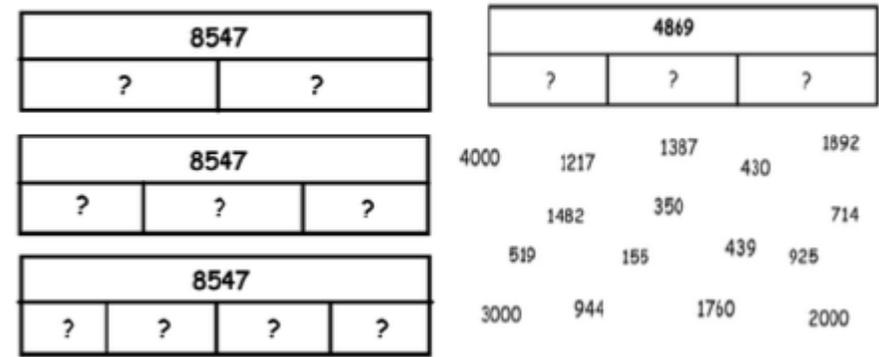
Children can explain the mistake made when the columns have not been ordered correctly.



Children to use part whole and bar model to develop estimation and number sense.

375.5	
?	14.3

Solve the following. Find two examples for each bar model.



Problem Solving

Which is easier to calculate?
 $59,027 - 23,359$ or $53,279 - 29,035$
Explain your reasoning.

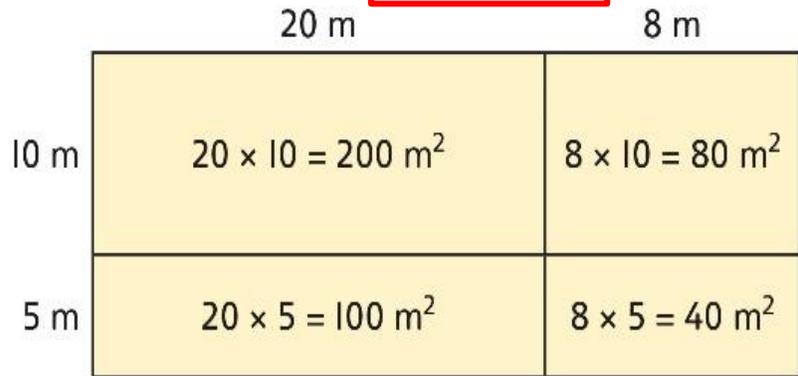
Multiplication

Start with 4 digits multiply by 1 digit, before slowly working towards multiplying 4 digits or more by a two digit number. Show regrouping **below** the calculation.

4 digit number x 1 digit number or 2 digit number
expanded method

$\begin{array}{r} 1236 \\ \times \quad 7 \\ \hline 42 \\ 210 \\ 1400 \\ \underline{7000} \\ 8652 \end{array}$	$\begin{array}{r} 72 \\ \times \quad 38 \\ \hline 16 \\ 560 \\ 60 \\ \underline{2100} \\ 2736 \\ 1 \end{array}$
(6×7) (30×7) (200×7) (1000×7)	(2×8) (70×8) (2×30) (70×30)

Area model



H	T	O
2	0	0
1	0	0
	8	0
	4	0
+		
4	2	0
	1	

Use known facts and unitising to multiply.

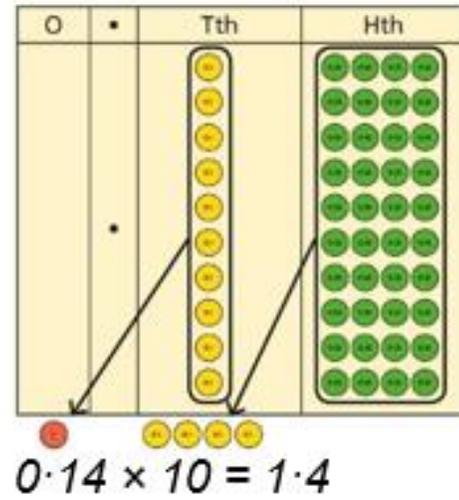
$$5 \times 4 = 20$$

$$5 \times 40 = 200$$

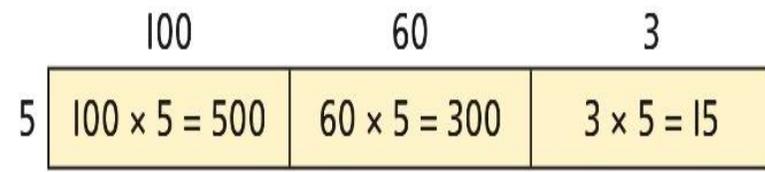
$$5 \times 400 = 2,000$$

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

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



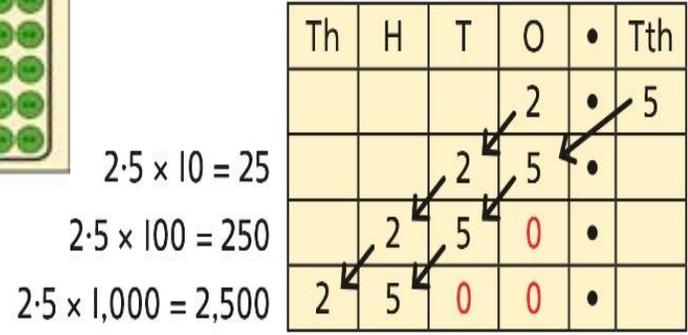
$$0.14 \times 10 = 1.4$$



4 digit number x 1 digit number
compact method

$\begin{array}{r} 345 \\ \times \quad 6 \\ \hline 2070 \\ \underline{23} \end{array}$	$\begin{array}{r} 4769 \\ \times \quad 3 \\ \hline 14307 \\ \underline{1222} \end{array}$
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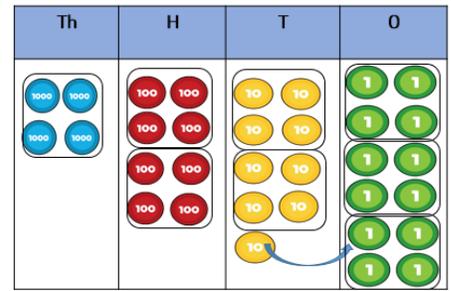
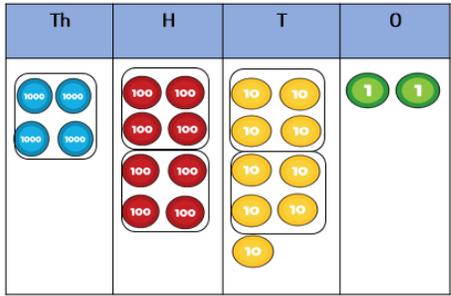
Multiplying decimals



Th	H	T	O	.	Tth
			2	.	5
		2	5	.	
	2	5	0	.	
2	5	0	0	.	

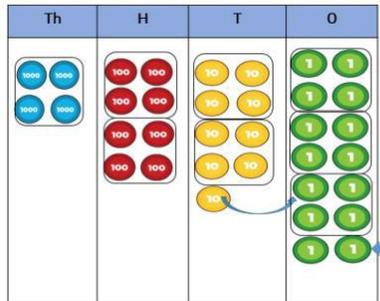
Division

Divide 4 digit number by 1 digit number- no remainder



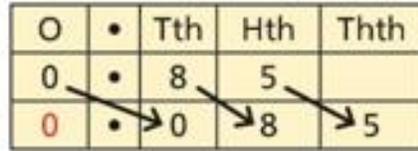
$$\begin{array}{r} 1223 \\ 4 \overline{)4892} \end{array}$$

Divide 4 digit number by 1 digit number- with remainder

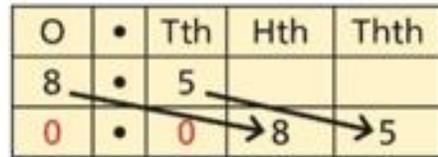


$$\begin{array}{r} 1223 \\ 4 \overline{)4894} \text{ r}2 \end{array}$$

Dividing decimals



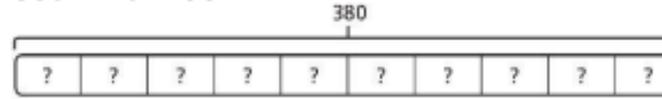
$$0.85 \div 10 = 0.085$$



$$8.5 \div 100 = 0.085$$

Bar model

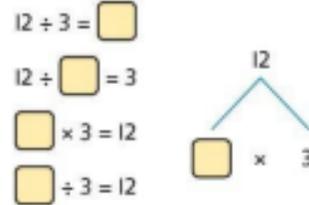
$$380 \div 10 = 38$$



$$432 \div 5 = 5 \overline{)432}$$

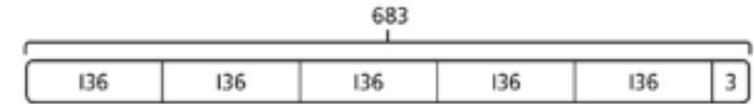
What is 500 divided by 5?

Represent the different multiplicative relationships to solve problems requiring inverse operations.



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

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



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

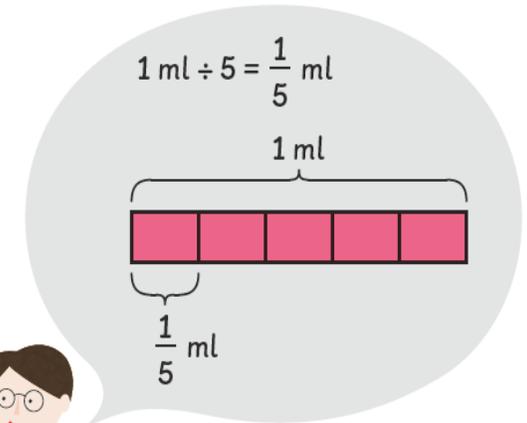
$$683 \div 5 = 136 \text{ r}3$$

Solve problems and write remainder as fraction

376 ml of liquid soap is poured into 5 bottles. Each bottle contains the same amount of soap. Find the volume of soap in each bottle.

$$5 \overline{)376} \begin{array}{l} 75 \text{ r}1 \end{array}$$

$$375 \div 5 = 75 \frac{1}{5} \text{ ml}$$



Use links between division and fractions to calculate divisions

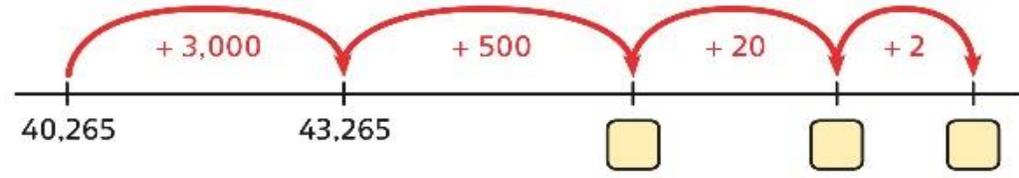
Year 6

Key Vocabulary

Number	Geometry	Statistics	Measurement	Algebra	Ratio and proportion
<p>ten thousands, hundred thousand, millions, ten million, place value, partition, interval, estimate, compare, order, equal to, rounding, negative, positive, column addition, column subtraction, order of operations, brackets, inverse operation, column multiplication, short division, long division, remainder, factor, common factor, common multiple, prime, composite, squared, cubed, multiple, estimate, long division, order of operations, numerator, denominator, common denominator, common factor, equivalent, simplify, simplest form, factor, whole number, mixed number, highest common factor, lowest common multiple, compare, order, ascending, descending, proper fraction, improper fraction, mixed number, convert, lowest common denominator, Per cent, percentages, part, whole, decimal, fraction, divide, share, multiply, convert, equivalent fraction, simplify, less than, more than, multiply, divide, decimal, decimal place, recurring decimal, placeholder, place value, tenth, hundredth, thousandth, product, fraction</p>	<p>degree, angle, obtuse, acute, reflex, right angle, protractor, triangle, isosceles, scalene, regular, polygon, quadrilateral, parallelogram, kite, rhombus, trapezium, diameter, radius, circumference, concentric, perimeter, net, pyramid, tetrahedron, cylinder, prism, cuboid, cube, vertically opposite angles, quadrant, four quadrants, translate, translation, x-axis, y-axis, axis, axes, horizontal, vertical, vertex, reflect, reflection.</p>	<p>mean, average, pie chart, segment, line graph, bar chart, percentage, fraction, data</p>	<p>metric, imperial, unit of measurement, gram, kilogram, pound, ounce, mass, millilitre, litre, pint, capacity, millimetre, centimetre, metre, millimetre, inch, foot, yard, mile, length, convert, conversion table, conversion graph, area, volume, perimeter, parallelogram, height, enclosed, width, length, square centimetre, square metre, base, estimate, formula, compound shape, cubic centimetre, cubic metre</p>	<p>algebra, formula, formulae, equation, unknown, variable, sequence, rule, term, substitute, expression, calculation, operation, generalise, inverse, solution</p>	<p>ratio, proportion, part, whole, scale, scale factor, notation, similar</p>

Addition

Adding numbers with more than 4 digits



TTh	Th	H	T	O
●●●●		●●	●●●●●●	●●●●●●
	●●●	●●●●●	●●	●●

TTh	Th	H	T	O
4	0	2	6	5
	3	5	2	2
<hr/>				

Decimal numbers

H	T	O	Tth	Hth
1	4	0	· 0	9
			· 8	9
<hr/>				
1	8	9	· 9	8
<hr/>				

- Vary the number of digit in the number.

$$247 + 14699 =$$

- Add more than two numbers together.

$$1424 + 345 + 12698 =$$

- Write = sign in different positions.

$$? = 6.9 + 14.32$$

- Balanced equations.

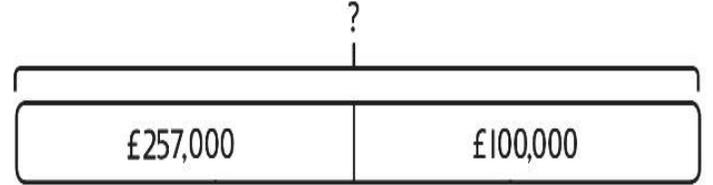
$$648 + ? = 1036 + 58$$

- Adding fractions.

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

Children to use part whole and bar model to develop estimation and number sense.

?	
487.3	2.9



Problem Solving

A is an odd number with rounds to 100,000 to the nearest ten thousand.
 It has a digit total of 30.
 B is an even number which rounds to 500,000 to the nearest hundred thousand.
 It has a digit total of 10.
 A and B are both multiples of 5 but end in different digits.

A	B
631,255	

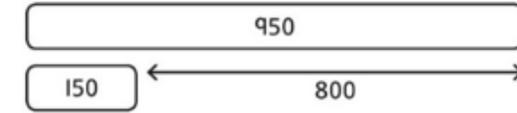
Subtraction

487.3	
?	2.9

Children to use part whole and bar model to develop estimation and number sense.

$$950,000 - 150,000$$

That is 950 thousands - 150 thousands



So, the difference is 800 thousands.

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

- Vary the number of digit in the number.

$$15.743 - 214.9 =$$

- Subtract more than two numbers.

$$143,524 - 12,345 - 1698 =$$

- Missing boxes.

$$\underline{\quad} - 200 = 23,837$$

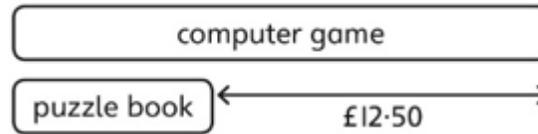
- Balanced equations.

$$231.64 - ? = 254.2 - 0.58$$

- Subtracting fractions.

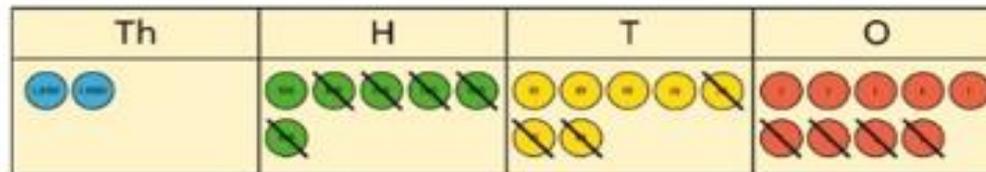
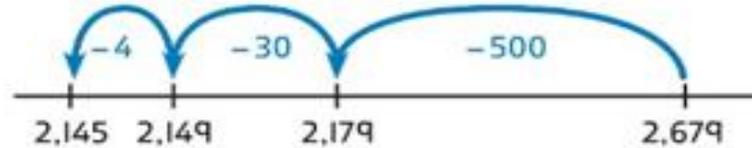
$$\frac{5}{6} - \frac{1}{4} =$$

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



Compare and select efficient method

Problem Solving



	Th	H	T	O
	2	6	7	9
-		5	3	4
	2	1	4	5

Multi-step problems

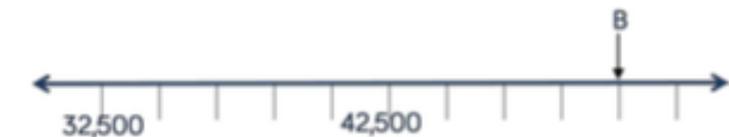
A four bedroom house cost £450,000.

A three bedroom house costs £199,000 less.

How much does the three bedroom house cost?

What method did you use to find the answer?

Find the difference between A and B



Multiplication

4 digit number x 2 digit number compact method

$$124 \times 26 =$$

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ + 2480 \\ \hline 3224 \end{array}$$

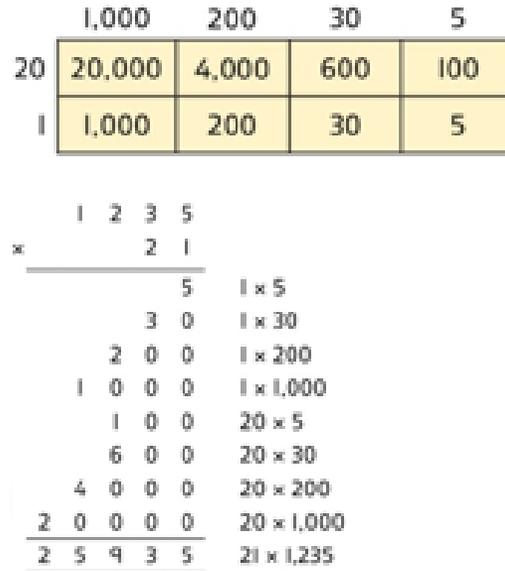
$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ + 2480 \\ \hline 3224 \end{array}$$

$$123 \times 45 = 5535$$

$$\begin{array}{r} 1235 \\ \times 21 \\ \hline 1235 \\ 24700 \\ \hline 25935 \end{array}$$

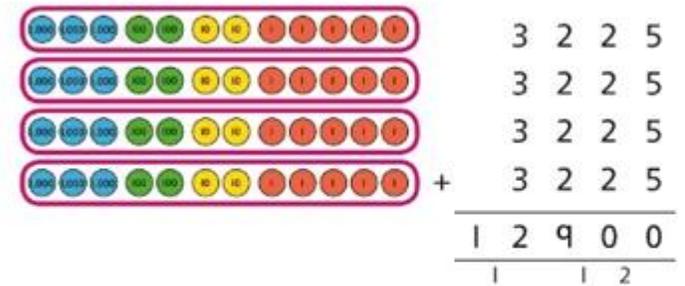
$1 \times 1,235$
 $20 \times 1,235$
 $21 \times 1,235$

Use an area model to support written multiplication

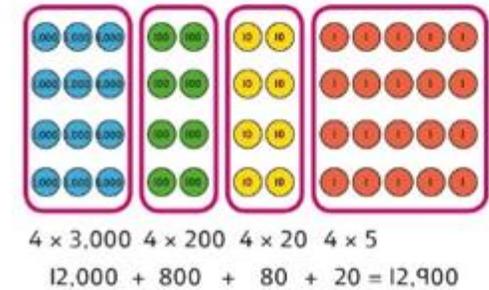


Use place value equipment to compare methods.

Method 1



Method 2



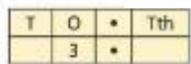
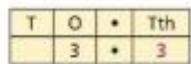
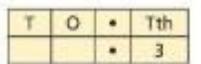
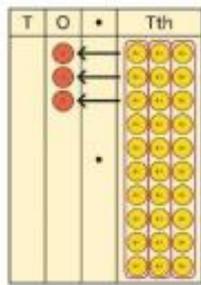
Decimals x 1 digit number expanded

$$9.30 \times 2 =$$

$$\begin{array}{r} 9.30 \\ \times 2 \\ \hline 0.60 \\ 18.00 \\ \hline 18.60 \end{array}$$

$$0.23 \times 9 =$$

$$\begin{array}{r} 0.23 \\ \times 9 \\ \hline 0.27 \\ 1.80 \\ \hline 2.07 \end{array}$$



Decimals x 1 digit number compact

$$\begin{array}{r} 0.23 \\ \times 9 \\ \hline 2.07 \end{array}$$

Use known facts to multiply decimals

$$4 \times 3 = 12$$

$$4 \times 0.3 = 1.2$$

$$4 \times 0.03 = 0.12$$

$$20 \times 5 = 100$$

$$20 \times 0.5 = 10$$

$$20 \times 0.05 = 1$$

Division

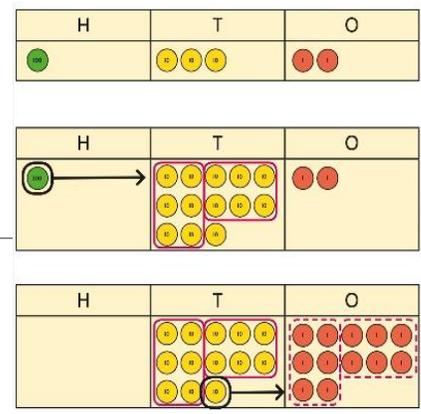
Divide 3 digit number by 2 digit number- long division

$$\begin{array}{r}
 28 \frac{4}{5} \\
 15 \overline{) 432} \\
 \underline{300} \quad (15 \times 20) \\
 132 \\
 \underline{120} \quad (15 \times 8) \\
 12
 \end{array}$$

Divide 3 digit number by 2 digit number- short division

496 ÷ 11 becomes

$$\begin{array}{r}
 45 \text{ r } 1 \\
 11 \overline{) 496} \\
 \underline{44} \\
 56 \\
 \underline{55} \\
 1
 \end{array}$$



How many groups of 6 are in 100?

$$6 \overline{) 100} = 16 \text{ r } 4$$

How many groups of 6 are in 13 tens?

$$6 \overline{) 130} = 21 \text{ r } 4$$

How many groups of 6 are in 12 ones?

$$6 \overline{) 12} = 2 \text{ r } 0$$

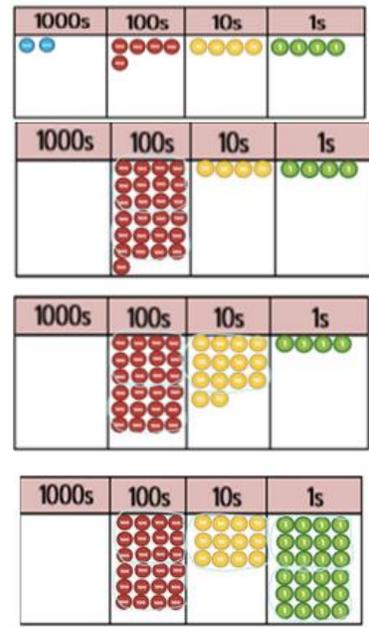
Decimal numbers divided by 1 digit number

$$6.42 \div 3 =$$

$$\begin{array}{r}
 2.14 \\
 3 \overline{) 6.42} \\
 \underline{6.00} \\
 0.42 \\
 \underline{0.30} \\
 0.12 \\
 \underline{0.00} \\
 0.00
 \end{array}$$

Divide 4 digit number by 2 digit number- long division

Long division using place value counters



We can't group 2 thousands into groups of 12 so will exchange them.

We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

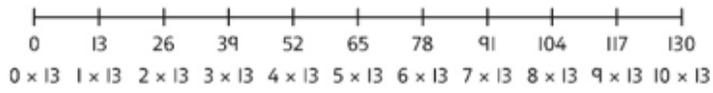
After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r}
 02 \\
 12 \overline{) 2544} \\
 \underline{24} \\
 1
 \end{array}$$

$$\begin{array}{r}
 021 \\
 12 \overline{) 2544} \\
 \underline{24} \\
 14 \\
 \underline{12} \\
 2
 \end{array}$$

$$\begin{array}{r}
 0212 \\
 12 \overline{) 2544} \\
 \underline{24} \\
 14 \\
 \underline{12} \\
 24 \\
 \underline{24} \\
 0
 \end{array}$$

$$377 \div 13 = ?$$

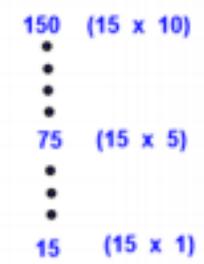


$$\begin{array}{r}
 13 \overline{) 377} \\
 \underline{130} \quad 10 \\
 247 \\
 \underline{247} \quad 10 \\
 0 \quad 20
 \end{array}$$

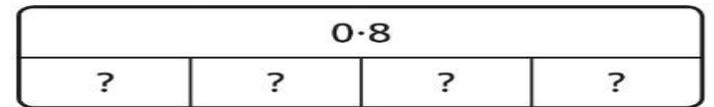
$$377 \div 13 = 29$$

$$\begin{array}{r}
 28.8 \\
 15 \overline{) 432.0} \\
 \underline{30} \\
 132 \\
 \underline{120} \\
 120 \\
 \underline{120} \\
 000
 \end{array}$$

Use times table ladders to help estimation



Bar model



$$4 \times 2 = 8$$

$$8 \div 4 = 2$$

$$\text{So, } 4 \times 0.2 = 0.8$$

$$0.8 \div 4 = 0.2$$

Decimal numbers divided by 2 digit number – short division

$$\begin{array}{r}
 1.46 \\
 35 \overline{) 511.0} \\
 \underline{35} \\
 161 \\
 \underline{140} \\
 210 \\
 \underline{210} \\
 0
 \end{array}$$