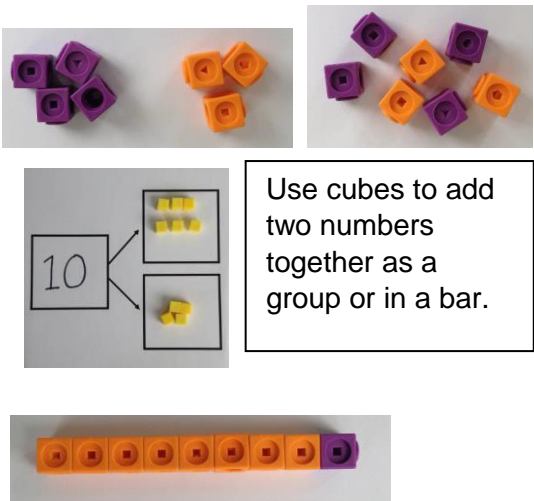
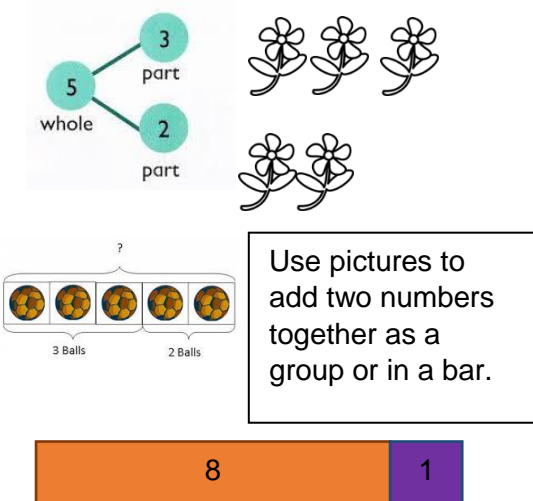
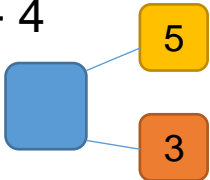

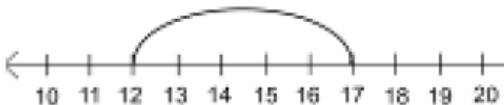


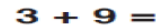
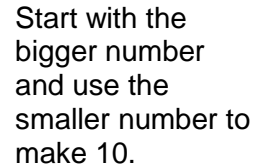
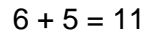


PRIDE,
PASSION,
PARTNERSHIP,
PERSEVERANCE,
PARTICIPATION.

Progression in Calculations : **Addition**

Objective & Strategies	Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole: part-whole model</p> <p>Taught from YR</p> <p>YR–Y1</p>	 <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	<p>$4 + 3 = 7$</p> <p>$10 = 6 + 4$</p>  <p>Use the part-part whole diagram as shown above to move into the abstract.</p>
<p>Starting at the bigger number and counting on:</p> <p>$\square + \square$ (bridging 10)</p> <p>$\square \square + \square$ (bridging 20)</p> <p>Taught from Y1</p>	 <p>Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</p>	<p>$12 + 5 = 17$</p>  <p>Start at the larger number on the number track and count on in ones or in one jump to find the answer.</p>	<p>$5 + 12 = 17$</p> <p>Place the larger number in your head and count on the smaller number to find your answer.</p>

Taught from Y1
Y1-2



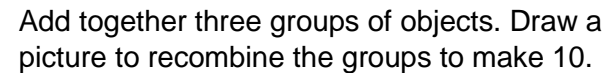
$9 + 5 = 14$

A number line from 0 to 20 with increments of 1. The number 9 is circled. A small jump of 1 unit is shown from 9 to 10, labeled '+1'. A larger jump of 4 units is shown from 10 to 14, labeled '+4'. The final sum 14 is also circled.

If I am at seven, how many more do I need to make 10. How many more do I add on now?

Taught from Y2
Y2

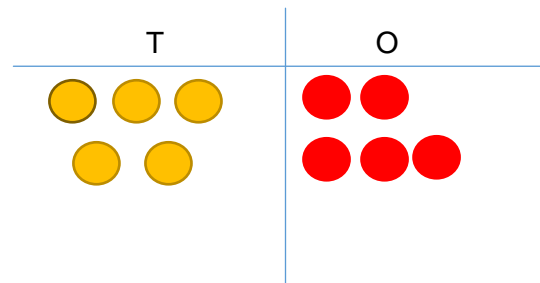
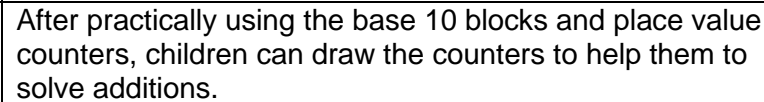
Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.



Combine the two numbers that make 10 and then add on the remainder.

Taught from Y2

Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.


$$\begin{array}{r} 21 \\ + 42 \\ \hline \end{array}$$

Column method- with regrouping

Taught from Y3
Y3-6

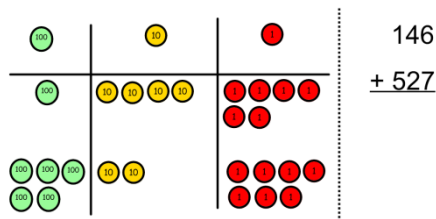
Y3 add numbers with
up to three digits
TO+TO
HTO+TO
HTO+HTO

Y4 add numbers with
up to 4 digits
including decimals:
money
(£7.85 + £3.49)

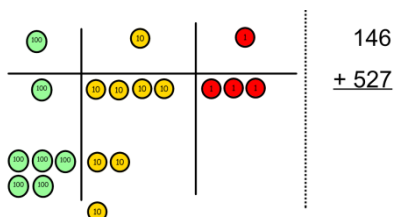
Y5 add whole numbers
with more than 4
digits including
decimals up to 2dp:
(23.7 + 48.56)

Y6 add up to 3 larger
whole numbers
including decimals up
to 3dp

Make both numbers on a place value
grid.



Add up the units and exchange 10 ones
for one 10.

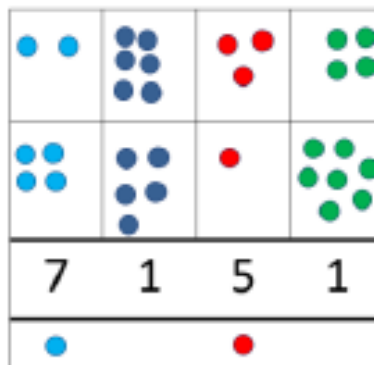


Add up the rest of the columns,
exchanging the 10 counters from one
column for the next place value column
until every column has been added.

This can also be done with Base 10 to
help children clearly see that 10 ones
equal 1 ten and 10 tens equal 100.

As children move on to decimals,
money and decimal place value
counters can be used to support
learning.

Children can draw a pictorial representation of the
columns and place value counters to further support their
learning and understanding.



Start by partitioning the
numbers before moving on
to clearly show the
exchange below the
addition.

$$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ 60 + 13 = 73 \end{array}$$

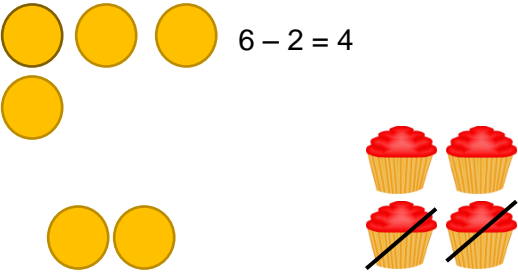
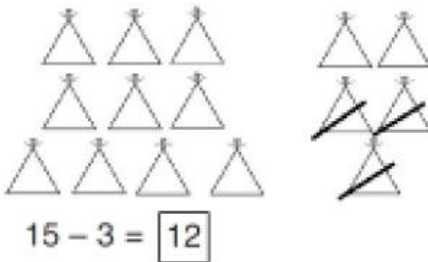


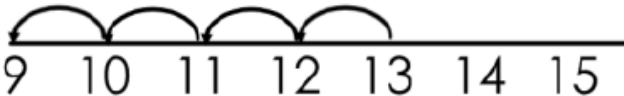
$$\begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$$

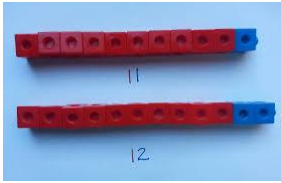
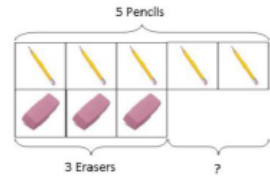
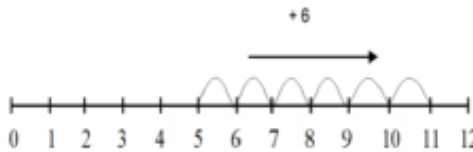
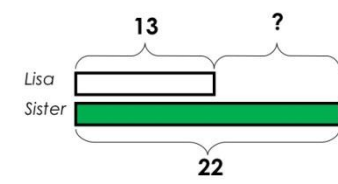
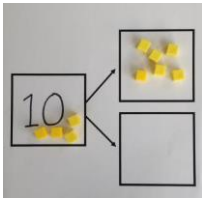
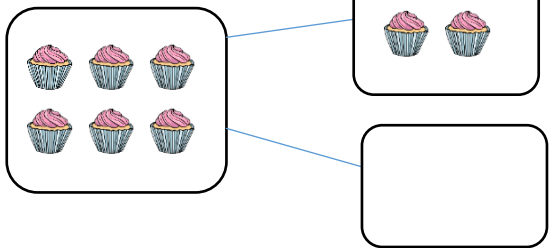
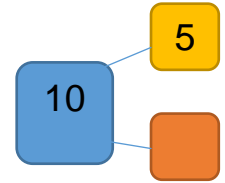

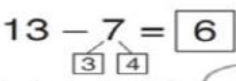

As the children
move on,
introduce
decimals with
the same number of
decimal places and
different. Money can be
used here.

$$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ 11 \end{array}$$

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \\ 212 \end{array}$$

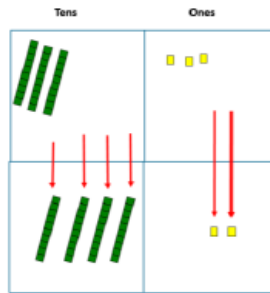
Progression in Calculations : **Subtraction**

Objective and Strategies	Concrete	Pictorial	Abstract
<p>Taking away ones</p> <p>Taught from YR</p> <p>YR–Y2</p>	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p>6 – 2 = 4</p>	<p>Cross out drawn objects to show what has been taken away.</p>  <p>15 – 3 = 12</p>	<p>18 - 3 = 15</p> <p>8 – 2 = 6</p>
<p>Counting back</p> <p>Taught from Y1</p> <p>Y1–Y2</p>	<p>Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.</p>  <p>13 – 4</p> <p>Use counters and move them away from the group as you take them away counting backwards as you go.</p> 	<p>Count back on a number line or number track</p>  <p>Start at the bigger number and count back the smaller number showing the jumps on the number line.</p>	<p>Put 13 in your head, count back 4. What number are you at? Use your fingers to help.</p>

<p>Find the difference</p> <p>$\square - \square$</p> <p>$\square \square - \square$ (bridging 10)</p> <p>Taught from Y2 Y2-Y6 Comparative bar model</p>	<p>Compare amounts and objects to find the difference.</p>  <p>Use cubes to build towers or make bars to find the difference</p>  <p>Use basic bar models with items to find the difference</p>	 <p>Count on to find the difference.</p> <p>Comparison Bar Models</p> <p>Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.</p>  <p>Draw bars to find the difference between 2 numbers.</p>	<p>Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.</p>
<p>Part Part Whole Model</p> <p>Taught from Y1</p>	<p>Link to addition- use the part whole model to help explain the inverse between addition and subtraction.</p>  <p>If 10 is the whole and 6 is one of the parts. What is the other part?</p> <p>$10 - 6 =$</p>	<p>Use a pictorial representation of objects to show the part part whole model.</p> 	 <p>Move to using numbers within the part whole model.</p>
<p>Make 10</p> <p>Taught from Y2</p>	<p>$14 - 9 =$</p>  <p>Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.</p>	<p>Counting back on a number track leading to use of number bond diagram as below:</p>  	<p>$16 - 8 =$</p> <p>How many do we take off to reach the next 10?</p> <p>How many do we have left to take off?</p>

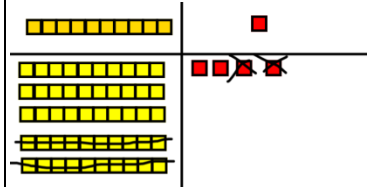
Column method without regrouping (bridging 10s)

$\square \square - \square \square$
Taught from Y2



Use Base 10 to make the bigger number then take the smaller number away.

Show how you partition numbers to subtract. Again make the larger number first.



Calculations

$$\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$$

Draw the Base 10 or place value counters alongside the written calculation to help to show working.

$$47 - 24 = 23$$

$$\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$$

This will lead to a clear written column subtraction.

$$\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$$

Column method with regrouping

Taught from Y3

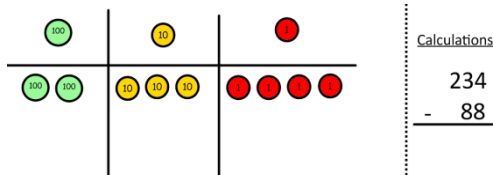
Y3-6

Y3 subtract numbers with up to three digits
TO-TO
HTO-TO
HTO-HTO

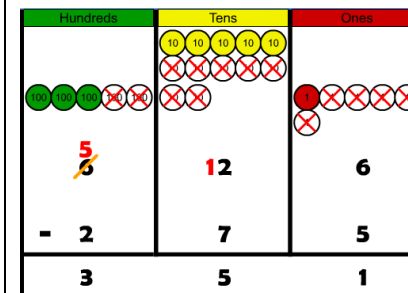
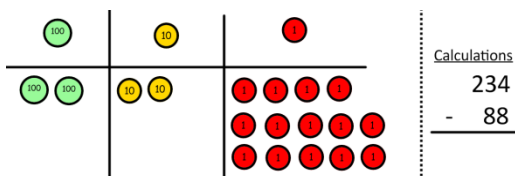
Y4 subtract numbers with up to 4 digits including decimals: money (£7.85 + £3.49)

Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.

Make the larger number with the place value counters



Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.



Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.

$$836 - 254 = 582$$

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 800 \quad 30 \quad 6 \\ - 200 \quad 50 \quad 4 \\ \hline 500 \quad 80 \quad 2 \end{array}$$

Children can start their formal written method by partitioning the number into clear place value columns.

$$728 - 582 = 146$$

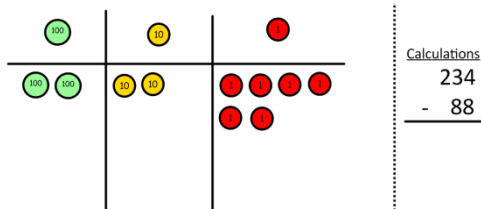
$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 700 \quad 20 \quad 8 \\ - 500 \quad 80 \quad 2 \\ \hline 100 \quad 40 \quad 6 \end{array}$$

Moving forward the children use a more compact method.

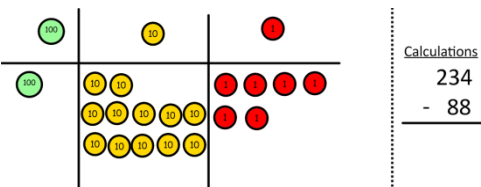
Y5 subtract whole numbers with more than 4 digits including decimals up to 2dp: (23.7 + 48.56)

Y6 subtract larger whole numbers including decimals up to 3dp

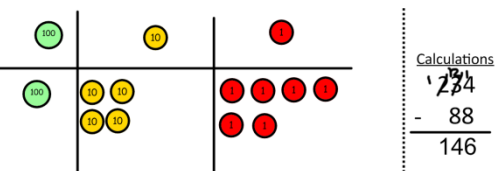
Now I can subtract my ones.



Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.



Now I can take away eight tens and complete my subtraction



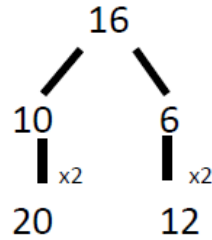


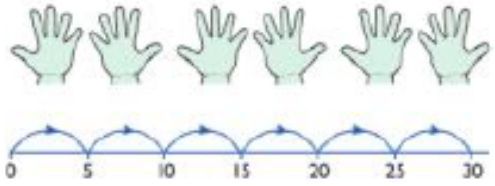


Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

This will lead to an understanding of subtracting any number including decimals.

$$\begin{array}{r} 5 \quad 12 \quad 1 \\ 2 \quad \cancel{6} \quad \cancel{3} \quad . \quad \color{red}{0} \\ - \quad 2 \quad 6 \quad . \quad 5 \\ \hline 2 \quad 3 \quad 6 \quad . \quad 5 \end{array}$$

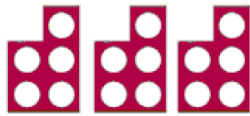
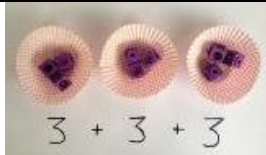
Multiplication

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling Taught from R Y1-2	<p>Use practical activities to show how to double a number.</p>  <p>double 4 is 8 $4 \times 2 = 8$</p>	<p>Draw pictures to show how to double a number.</p> <p>Double 4 is 8</p> 	 <p>Partition a number and then double each part before recombining it back together.</p>
Counting in multiples Taught from Y1 Y1-2	  <p>Count in multiples supported by concrete objects in equal groups.</p>	 <p>Use a number line or pictures to continue support in counting in multiples.</p>	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>

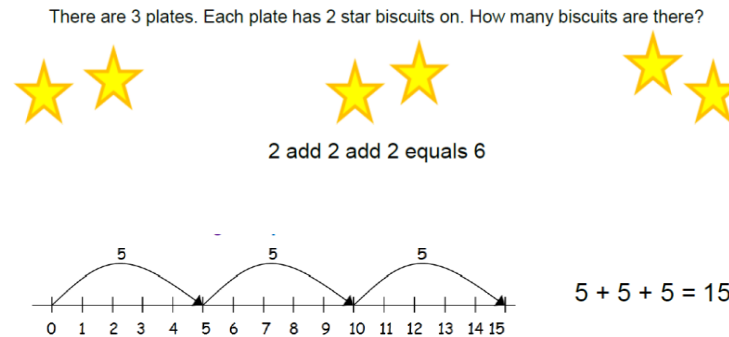
Repeated addition

Taught from Y1

Y1-2



Use different objects to add equal groups.



Write addition sentences to describe objects and pictures.



Arrays- showing commutative multiplication

Taught from Y1

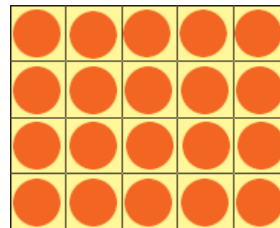
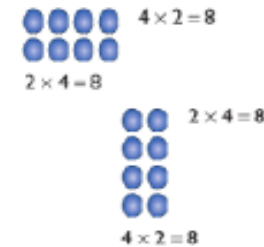
Y1-2

Y2 Expectations use
x2, x5 & x 10 table
facts

Create arrays using counters/ cubes to show multiplication sentences.



Draw arrays in different rotations to find **commutative** multiplication sentences.



Link arrays to area of rectangles.

Use an array to write multiplication sentences and reinforce repeated addition.



$$5 + 5 + 5 = 15$$

$$3 + 3 + 3 + 3 + 3 = 15$$

$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

Grid Method

Taught from Y3

Y4-6

Y3

TO x O

Use x2,x3,x4, x5, x8
& x 10 table facts

Y4

TO x O

HTO x O

Use x2,x3,x4, x5,x6,
x7, x8, x9, x 10, x11
& x12 table facts

Y5

HTO x O

TO x TO

O.t x O

Y6

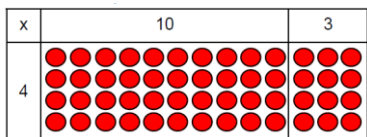
Integer x O (e.g.
2307 x 8)

Decimal x O (e.g.
31.6 x 7)

TO x TO

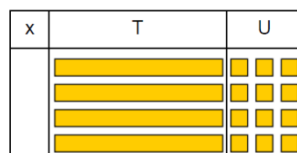
HTO x TO

Show the link with arrays to first introduce the grid method.



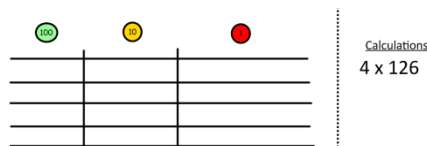
4 rows
of 10
4 rows
of 3

Move on to using Base 10 to move towards a more compact method.



4 rows of 13

Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.



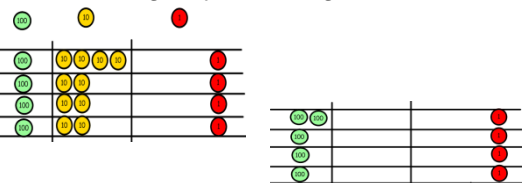
Calculations
4 x 126

Fill each row with 126.



Calculations
4 x 126

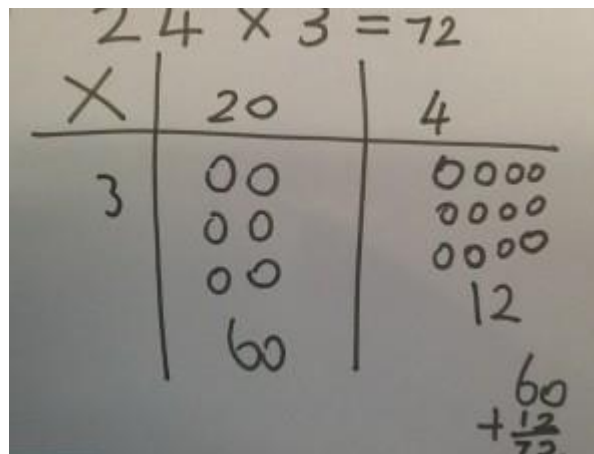
Add up each column, starting with the ones making any exchanges needed.



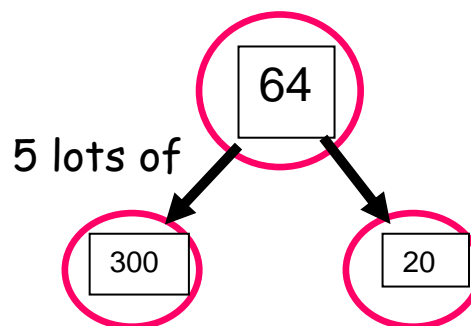
Then you have your answer.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Maths No Problem Y3 Number bond diagrams



$$5 \times 60 = 300$$

$$5 \times 4 = 20$$

$$5 \times 6 = 30$$

$$300 + 20 = 320$$

Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

x	30	5
7	210	35

$$210 + 35 = 245$$

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

	10	8
10	100	80
3	30	24

x	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Column multiplication

Taught from Y3

Y3-6

Y3

TO x O

Use x2,x3,x4, x5, x8
& x 10 table facts

Y4

TO x O

HTO x O

Use x2,x3,x4, x5,x6,
x7, x8, x9, x 10, x11
& x12 table facts

Y5

HTO x O

TO x TO

O.t x O

Y6

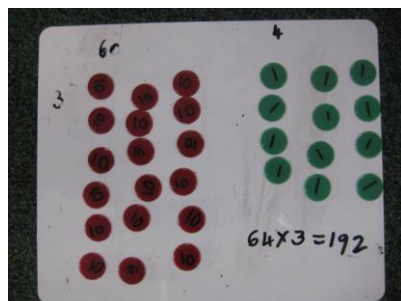
Integer x O (e.g.
2307 x 8)

Decimal x O (e.g.
31.6 x 7)

TO x TO

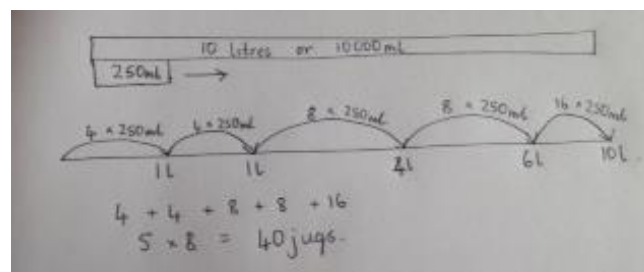
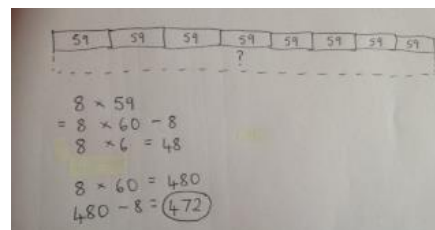
HTO x TO

Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

If it helps, children can write out what they are solving next to their answer.

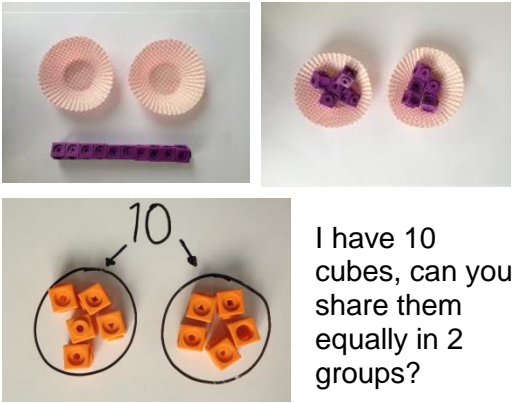
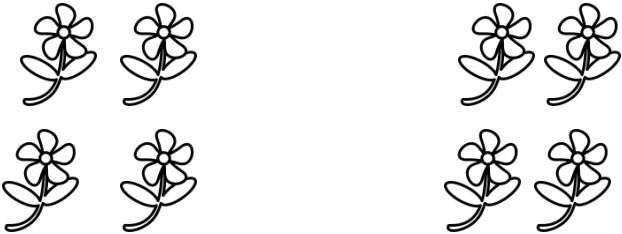
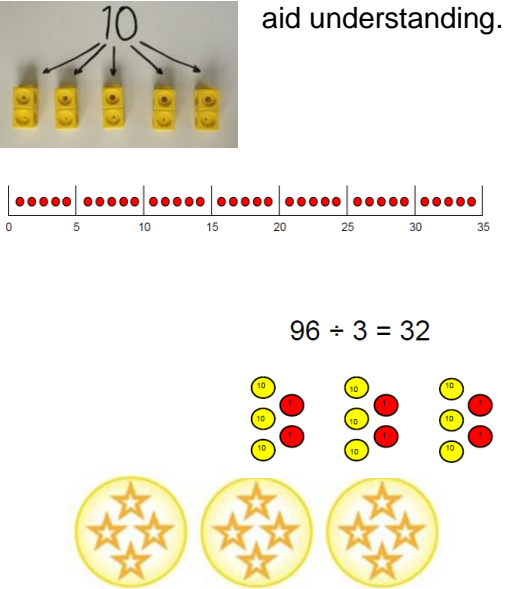
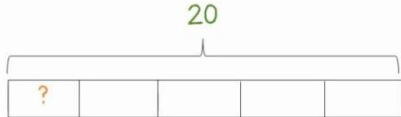
$$\begin{array}{r} 32 \\ \times 24 \\ \hline 8 \quad (4 \times 2) \\ 120 \quad (4 \times 30) \\ 40 \quad (20 \times 2) \\ 600 \quad (20 \times 30) \\ \hline 768 \end{array}$$

$$\begin{array}{r} 74 \\ \times 63 \\ \hline 12 \\ 210 \\ 240 \\ + 4200 \\ \hline 4662 \end{array}$$

This moves to the more compact method.

$$\begin{array}{r} 231 \\ 1342 \\ \times 18 \\ \hline 13420 \\ 10736 \\ \hline 24156 \\ 1 \end{array}$$

Division

Objective and Strategies	Concrete	Pictorial	Abstract
<p>Sharing objects into groups</p> <p>Taught from YR</p> <p>R-Y2</p>	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $8 \div 2 = 4$ </div>	<p>Share 9 buns between three people.</p> $9 \div 3 = 3$
<p>Division as grouping</p> <p>Taught from Y2</p> <p>Y3- Y4</p>	<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p>  <p>$96 \div 3 = 32$</p>	<p>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.</p>  $20 \div 5 = ?$ $5 \times ? = 20$	<p>$28 \div 7 = 4$</p> <p>Divide 28 into 7 groups. How many are in each group?</p>

Division within arrays

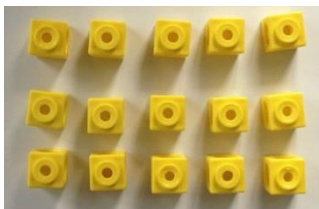
Taught from Y2

Y2-4

Y2 Use x2,x5 & x 10 table facts (or where divisor is 2, 5 or 10)

Y3 Use x2,x3,x4, x5, x8 & x 10 table facts (or where divisor is 2, 3, 4, 5, 8 or 10)

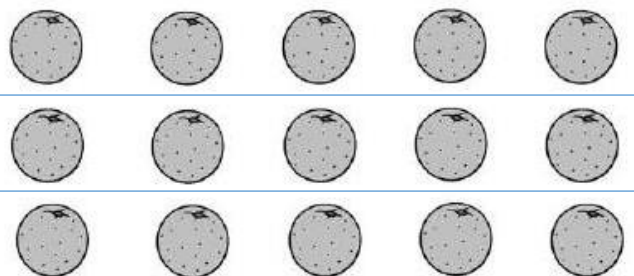
Y4 Use x2,x3,x4, x5,x6, x7, x8, x9, x10, x11 & x12 table facts (or where divisor is 2, 3, 4, 5, 6, 7, 8, 9 or 10)



Link division to multiplication by creating an array and thinking about the

number sentences that can be created.

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



Draw an array and use lines to split the array into groups to make multiplication and division sentences.

Find the inverse of multiplication and division sentences by creating four linking number sentences.

$7 \times 4 = 28$
 $4 \times 7 = 28$
 $28 \div 7 = 4$
 $28 \div 4 = 7$

Division with a remainder

Taught from Y2

Y3-4

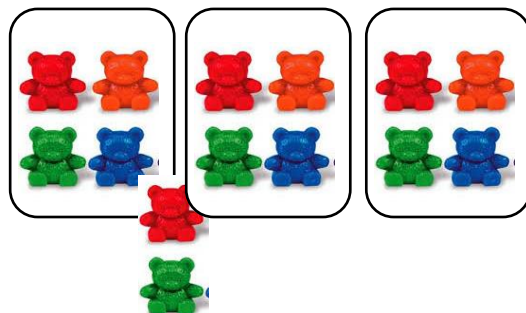
TO $\div 0$

Y3 where divisor is: 2, 3, 4, 5, 8 or 10

Y4 where divisor is: 2, 3, 4, 5, 6, 7, 8 or 9

$14 \div 3 =$

Divide objects between groups and see how much is left over



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



Complete written divisions and show the remainder using r.

$29 \div 8 = 3 \text{ REMAINDER } 5$

↑
dividend
↑
divisor
↑
quotient
↑
remainder

$$\begin{array}{r} 4 \overline{) 50} \\ \underline{40} (10 \times 4) \\ 10 \\ \underline{8} (2 \times 4) \\ 2 \\ \text{Answer } 12 \text{ r } 2 \end{array}$$

Short division

Taught from Y3

Y3-4

Y3 TO \div O

Y3 where divisor is: 2, 3, 4, 5, 8 or 10

Y4 TO \div O

Y4 where divisor is: 2, 3, 4, 5, 6, 7, 8 or 9

Y5 HTO \div O

Th HTO \div O

Y6

Integer \div O

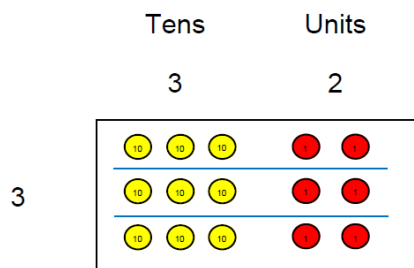
(eg $123 \div 7$)

Decimal \div O

(eg $27.6 \div 8$)

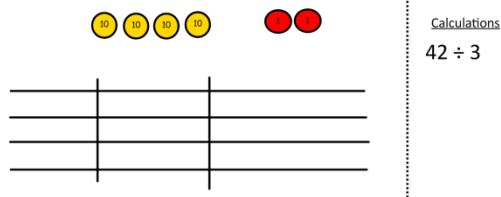
HTh, TTh, Th, HTO \div TO

($356,786 \div 4$)



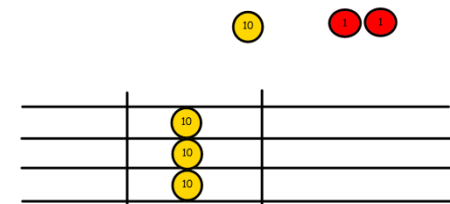
$$96 \div 3 = 32$$

Use place value counters to divide using the bus stop method alongside

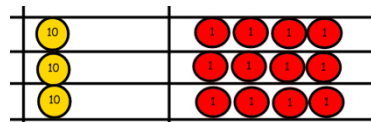


$$42 \div 3 =$$

Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.



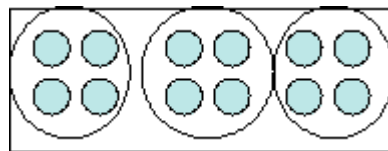
We exchange this ten for ten ones and then share the ones equally among the groups.



We look how much in 1 group so the answer is 14.

Model this changing H into T and

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Maths No Problem Y3 Number bond diagrams

$$96 \div 3$$

$$90 \div 3 = 30$$

$$(9 \div 3 = 3)$$

$$30 + 2 = 32$$

$$6 \div 3 = 2$$

$$96 \div 7 =$$

$$\begin{array}{r} 96 \\ -70 \quad (7 \times 10) \\ \hline 26 \\ -21 \quad (7 \times 3) \\ \hline 5 \end{array}$$

Answer: 13 R 5

$$196 \div 6 =$$

$$\begin{array}{r} 6 \overline{)196} \\ -60 \quad 6 \times 10 \\ \hline 136 \\ -60 \quad 6 \times 10 \\ \hline 76 \\ -60 \quad 6 \times 10 \\ \hline 16 \\ -12 \quad 6 \times 2 \\ \hline 4 \quad 32 \end{array}$$

Answer: 32 R 4

Begin with divisions that divide equally with no remainder.

$$\begin{array}{r} 2 \quad 1 \quad 8 \\ 4 \overline{)872} \end{array}$$

dividing HT by O as well as changing Th into hundreds and dividing Th, H by ones.

Move onto divisions with a remainder.

$$\begin{array}{r} 86 \text{ r } 2 \\ 3 \overline{) 432} \\ 5 \end{array}$$

Finally move into decimal places to divide the total accurately.

$$\begin{array}{r} 14.6 \\ 16 \overline{) 351.0} \\ 35 \end{array}$$