How we teach it.

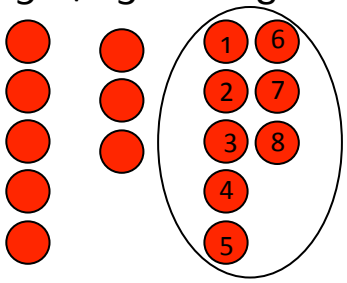
Written and mental calculation at Stage 1

Written Addition at Stage 1

Method:

Counting all:

5 + 3 = 8



The children use counters or other objects to support their addition. They count out the right amount of counters and then count how many they have altogether.

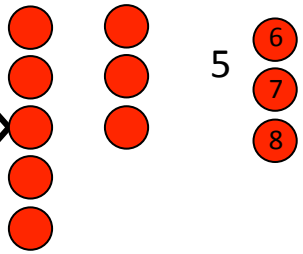
Children are encouraged to then record this as a sum.

I count out 5 counters and 3 counters.
I out the counters togtehr and count them together.
1, 2, 3, 4, 5, 6, 7, 8

Leading to:

Counting on:

5 + 3 = 8



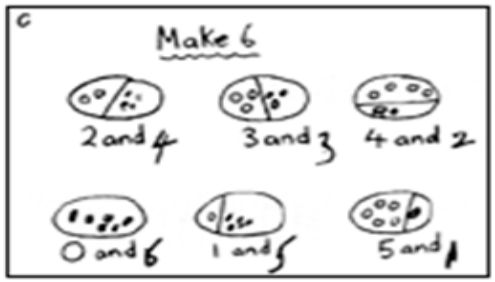
The children continue to use counters or other objects to support their addition.

However, they are now encouraged to hold the larger number in their head. Then they count on the lower number.

Children are encouraged to then record this as a sum.

I count out 3 counters
I put the number 5 in my head,
Then I count on
6,7,8

Strategies to support:

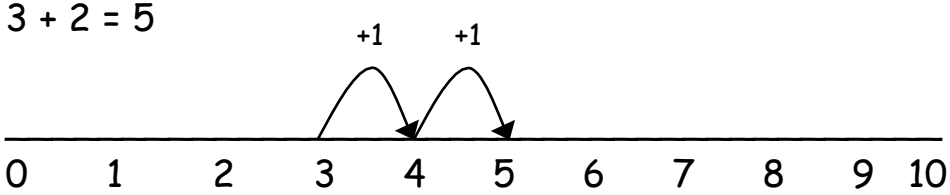


Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.

Next Steps:

Using a number line, by starting on the biggest number and counting on the number they are adding.

3 + 2 = 5



Written Subtraction at Stage 1

Method:

Counting all:

8 - 3 = 5



I count 8 counters.
I take 3 away.
I count how many have left.

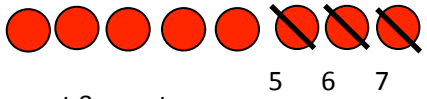
The children use counters or other objects to support their subtraction. They count out the right amount of counters and then move away the number of counters they are taking away. They then count how many they have left.

Children are encouraged to then record this as a sum.

Leading to:

Counting on:

8 - 3 = 5



I count 8 counters.
I keep 8 in my head.
I count backwards 3 as I move 3 counters away.
7, 6, 5

The children continue to use counters or other objects to support their subtraction.

However, they are now encouraged to hold the larger number in their head. Then they count back the number they are taking away.

Children are encouraged to then record this as a sum.

Strategies to support:

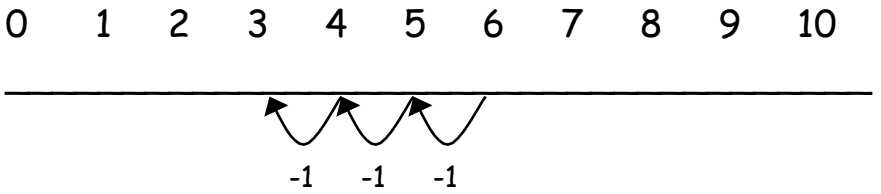
Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.



Next Steps:

Using a number line, by starting on the biggest number and counting back the number they are subtracting.

6 – 3 = 3



Mental Addition and Subtraction at Stage 1

Children should be able to recall:

- Number pairs with a total of 10, e.g. 3 + 7, or what to add to a single digit number to make 10.

- Addition facts for totals to at least 5, e.g. 2 +3, 4+3

- Addition doubles for all numbers to at least 10, e.g. 8+8

Working mentally, children should be able to:

- Add and subtract a pair of single digit numbers, e.g. 4 +5, 8-3

- Add or subtract a single digit number to or from a teens number, e.g. 13 +5, 17+3
- Add or subtract a single digit to or from 10, and add a multiple of 10, and add a multiple of 10 to a single digit number, e.g. 10+7, 7 +30

- Add near doubles, e.g. 6+7

Children should know when to:

- Reorder numbers when adding, e.g. putting the largest number first
- Count on or back in ones, twos or tens

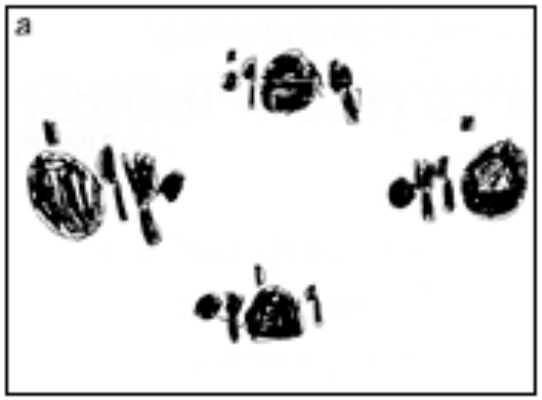
- Partition small numbers, e.g. 8+3 = 8+2+1
- Partition and combine tens and ones

- Partition: Double and adjust, e.g. 5+6 = 5+5+1

Written Multiplication at Stage 1

Method:

Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.



Leading to:

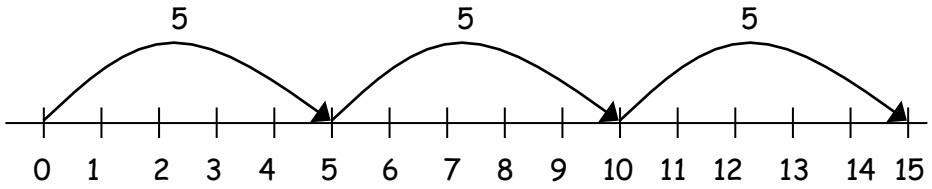
Children will develop their understanding of multiplication and use jottings to support calculation:

Repeated addition

3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3

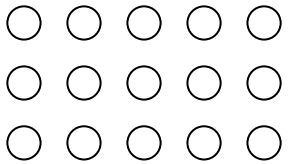
Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5



Strategies to support:

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



5 x 3 = 15

3 x 5 = 15

Next Steps:

Repeated addition

4 times 6 is 6 + 6 + 6 + 6 = 24 or 4 lots of 6 or 6 x 4

Children should use number lines and bead bars to support their understanding.

Written Division at Stage 1

Method:

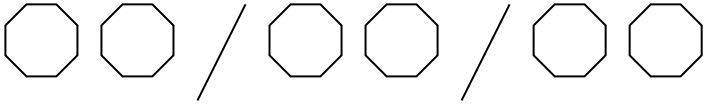
Children will understand equal groups and share items out in play and problem solving.
They will count in 2s and 10s and later in 5s.



Leading to:

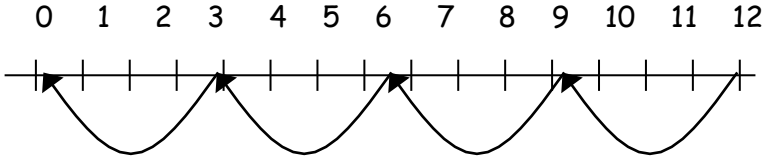
Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?



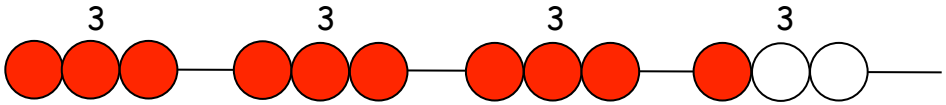
Repeated subtraction using a number line and bead bar

12 ÷ 3 = 4



Strategies to support:

The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'



Next Steps:

Using symbols to stand for unknown numbers to complete equations using inverse operations.

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

Mental Multiplication and Division at Stage 1 and Stage 2

Children should be able to recall:

Year 1

- Doubles of all numbers to 10, e.g. double 6
- Odd and even numbers to 20

Year 2

- Doubles of all numbers to 20 and corresponding halves
- Doubles of multiples of 10 to 50 and corresponding halves

- Multiplication facts for the 2, 5 and 10 times tables, and corresponding division facts
- Odd and even numbers to 100

Working mentally, children should be able to:

Year 1

- Count on from and back to zero in ones, twos, fives or tens

Year 2

- Double any multiple of 5 up to 50, e.g. double 35
- Halve any multiple of 10 up to 100, e.g. halve 90

- Find half of even numbers to 40
- Find the total number of objects when they are organised into groups of, 2, 5 or 10.

Children should know when to:

Year 1

- **Use patterns of last digit, e.g. 0 and 5 when counting in 5's.**

Year 2

- Partition double the tens and ones separately, then recombine
- Use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by two.

- Use knowledge of multiplication facts from the 2, 5 and 10 times table, e.g. recognise that there are 15 objects altogether because there are three groups of five.

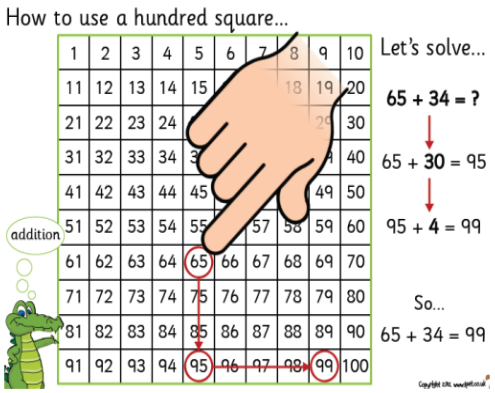
How we teach it.

Written and mental calculation at Stage 2

Written Addition at Stage 2

Method:

Using a Hundred Square:



When children are ready to be adding larger numbers they will do so on a hundred square.

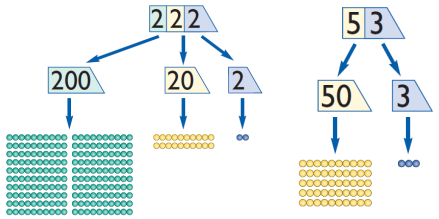
They will be encouraged to jump down in 10s and forwards in units.

Children are encouraged to then record this as a sum.

Leading to:

Partitioning:

222 + 53 =



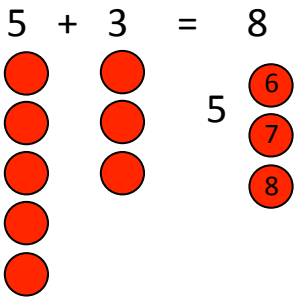
2 + 3 = 5
20 + 50 = 70
200 + 0 = 200
200 + 70 + 5 = 275

When children are confident in using a hundred square and have a good understanding of place value, they can then begin to partition.

This involves partitioning the numbers into 10s and units and adding these. Then recombining the 10s and units to get an answer.

Strategies to support:

Counting on:



I count out 3 counters
I put the number 5 in my head,
Then I count on
6,7,8

The children continue to use counters or other objects to support their addition.

However, they are now encouraged to hold the larger number in their head. Then they count on the lower number.

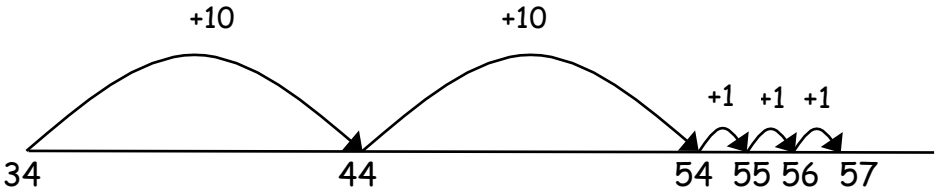
Children are encouraged to then record this as a sum.

Next Steps:

Children will begin to use 'blank number lines' where they draw a line starting with the larger number and counting on the number they are adding.

First counting on in jumps of tens and then ones.

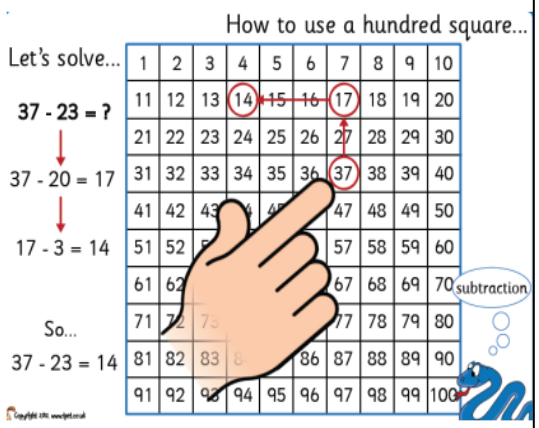
34 + 23 = 57



Written Subtraction at Stage 2

Method:

Using a Hundred Square:



When children are ready to subtract larger numbers they will do so on a hundred square.

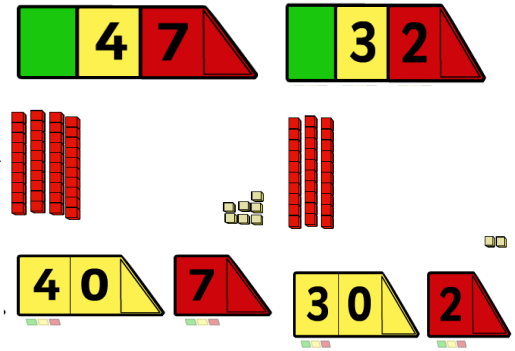
They will be encouraged to up in jumps of 10s and back in jumps of units.

Children are encouraged to then record this as a sum.

Leading to:

Partitioning:

47 - 32 =



40 - 30 = 10

7 – 2 = 5

10 + 5 = 15

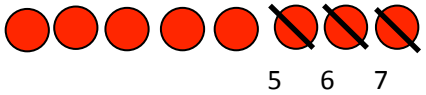
When children are confident in using a hundred square and have a good understanding of place value, they can then begin to partition.

This involves partitioning the numbers into 10s and units and subtracting these. Then recombining the 10s and units to get an answer.

Strategies to support:

Counting on:

8 - 3 = 5



I count 8 counters.
I keep 8 in my head.
I count backwards 3 as I move 3 counters away.
7, 6, 5

The children continue to use counters or other objects to support their subtraction.

However, they are now encouraged to hold the larger number in their head. Then they count back the number they are taking away.

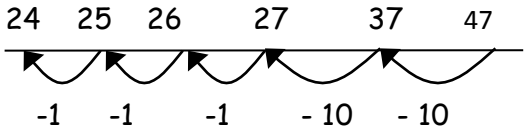
Children are encouraged to then record this as a sum.

Next Steps:

Children will begin to use blank number lines to support calculations.

Counting back
First counting back in tens and then in ones.

47 - 23 = 24



Mental Addition and Subtraction at Stage 2

Children should be able to recall:

- Addition and subtraction facts for all numbers up to at least 10, e.g. 3 +4, 8 -5
- Number pairs with totals to 20

- All pairs of multiples of 10 with totals up to 100, e.g. 30 +70
- What must be added to any two – digit number to make the next multiple of 10.

- Addition doubles for all numbers to 20, e.g. 17 +17 and multiples of 10 to 50, e.g. 40 + 40

Working mentally, children should be able to:

- Add and subtract a pair of single-digit numbers, including crossing 10, e.g. 5+8, 12 -7
- Add any single digit number to or from a multiple of 10, e.g. 60 +5

- Subtract any single digit number from a multiple of 10, e.g. 80 – 7
- Add and subtract a single digit number to or from a two digit number, including crossing the tens boundary, e.g. 23 +5, 57+3, then 28 +5, 52 -7.

- Add or subtract a multiple of 10 to or from any two digit number, e.g. 27 +60, 72 -50
- Add 9, 19, 29, … or 11. 21. 31, …
- Add near doubles, e.g. 13 + 14, 39 +40

Children should know when to:

- Reorder numbers when adding
- Partition: bridge through 10 and multiples of 10 when adding and subtracting

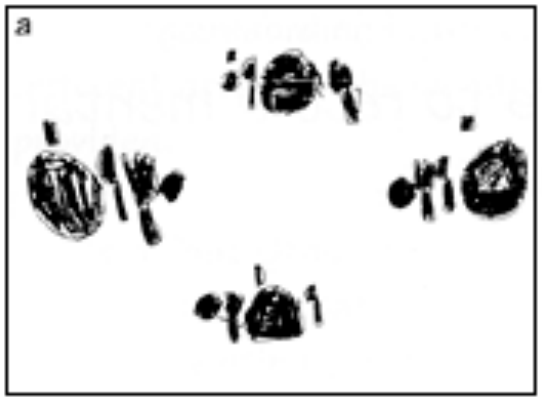
- Partition and combine multiples of tens and ones
- Use knowledge of pairs making 10
- Partition: Count on in tens and ones to find the difference

- Partition: add a multiple of 10 and adjust by 1
- Partition: double and adjust

Written Multiplication at Stage 2

Method:

Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.



Leading to:

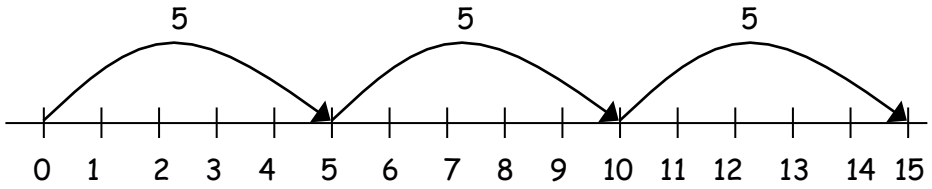
Children will develop their understanding of multiplication and use jottings to support calculation:

Repeated addition

3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3

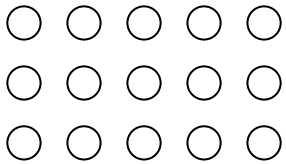
Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5



Strategies to support:

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



5 x 3 = 15

3 x 5 = 15

Next Steps:

Repeated addition

4 times 6 is 6 + 6 + 6 + 6 = 24 or 4 lots of 6 or 6 x 4

Children should use number lines and bead bars to support their understanding.

Written Division at Stage 2

Method:

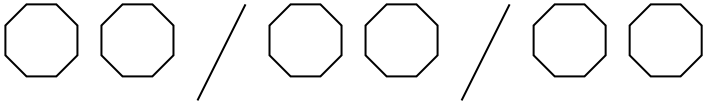
Children will understand equal groups and share items out in play and problem solving.
They will count in 2s and 10s and later in 5s.



Leading to:

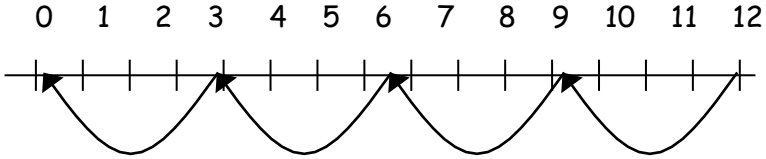
Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?



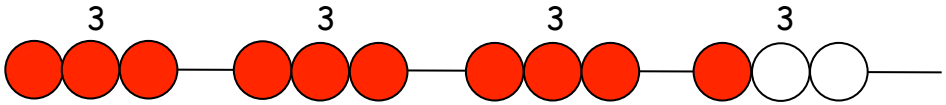
Repeated subtraction using a number line and bead bar

12 ÷ 3 = 4



Strategies to support:

The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'



Next Steps:

Using symbols to stand for unknown numbers to complete equations using inverse operations.

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

Mental Multiplication and Division at Stage 1 and Stage 2

Children should be able to recall:

Year 1

- Doubles of all numbers to 10, e.g. double 6
- Odd and even numbers to 20

Year 2

- Doubles of all numbers to 20 and corresponding halves
- Doubles of multiples of 10 to 50 and corresponding halves

- Multiplication facts for the 2, 5 and 10 times tables, and corresponding division facts
- Odd and even numbers to 100

Working mentally, children should be able to:

Year 1

- Count on from and back to zero in ones, twos, fives or tens

Year 2

- Double any multiple of 5 up to 50, e.g. double 35
- Halve any multiple of 10 up to 100, e.g. halve 90

- Find half of even numbers to 40
- Find the total number of objects when they are organised into groups of, 2, 5 or 10.

Children should know when to:

Year 1

- **Use patterns of last digit, e.g. 0 and 5 when counting in 5's.**

Year 2

- Partition double the tens and ones separately, then recombine
- Use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by two.

- Use knowledge of multiplication facts from the 2, 5 and 10 times table, e.g. recognise that there are 15 objects altogether because there are three groups of five.

How we teach it.

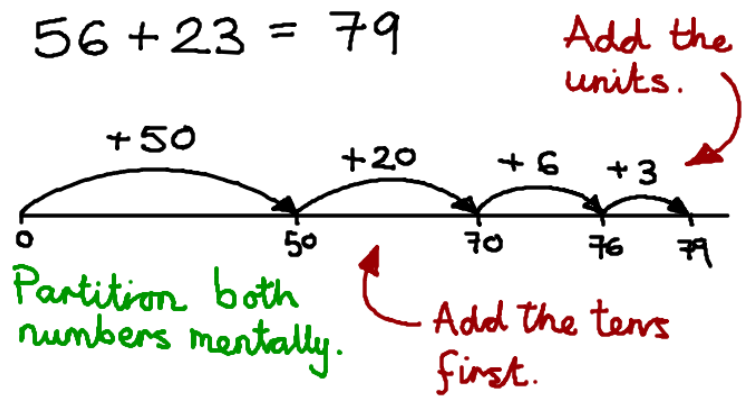
Written and mental calculation at Stage 3

Written Addition at Stage 3

Method:

Addition using a number line.

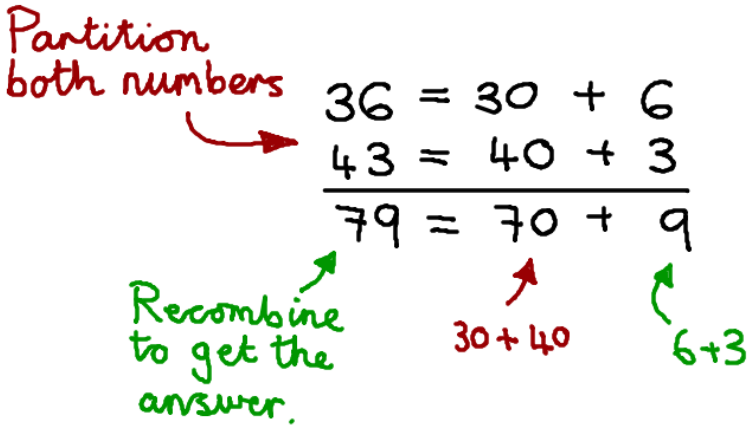
In Year 3 we will be partitioning both numbers and adding on a number line.



Leading to:

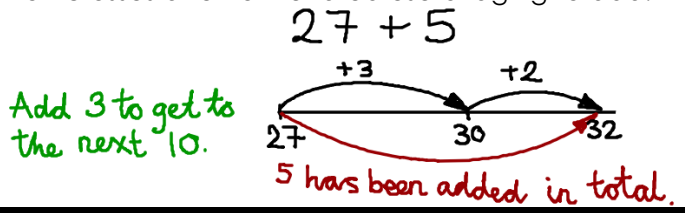
The Expanded Method of Addition.

Partitioning both numbers on a number line leads into using a more formal method of addition.



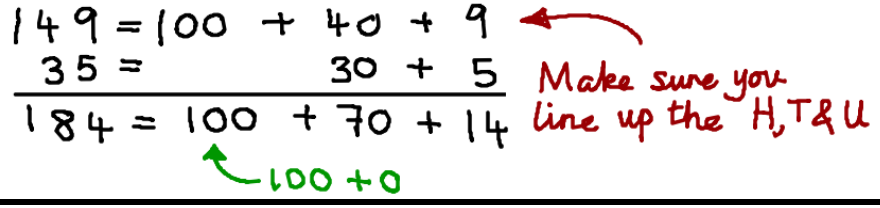
Strategies to support:

When addition crosses a ten or hundred use bridging to add.



Next Steps:

Adding **3 digit numbers** using the expanded method.



Mental Addition at Stage 3

Children should be able to recall:

- Addition facts for all numbers to 20 drawing on knowledge of inverse relationship.
  E.g. 9 + 8, 13 + 6

- Sums of multiples of 10.
  E.g. 50 + 80
- Pairs of two-digit numbers with a total of 100.
  E.g. 32 + 68

- Addition doubles for multiples of 10 to 100.
  E.g. 90 + 90

Working mentally, children should be able to:

- Add and subtract groups of small numbers.
  E.g. 6 + 3 - 2

- Add two-digit numbers.
  E.g. 34 + 65
- Add a two-digit number from a multiple of 10.
  E.g. 50 + 38

- Add near doubles.
  E.g. 16 + 18 = 16 + 16 +2

Children should know when to:

- Reorder numbers when adding.
- Identify pairs totalling 10 or multiples of 10.

- Partition: Add tens and ones separately then recombine.
- Partition: Count on in tens and ones to find the total.
- Partition: Add 10 or 20 and adjust.

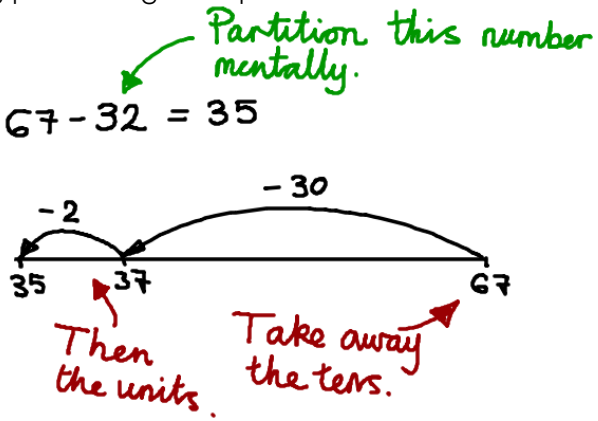
- Partition: Double and adjust when adding near doubles.
- Count on in minutes and hours bridging through 60.

Written Subtraction at Stage 3

Method:

Counting back using a number line.

In Year 3 we will be using a number line to count back from the biggest number using partitioning to help.

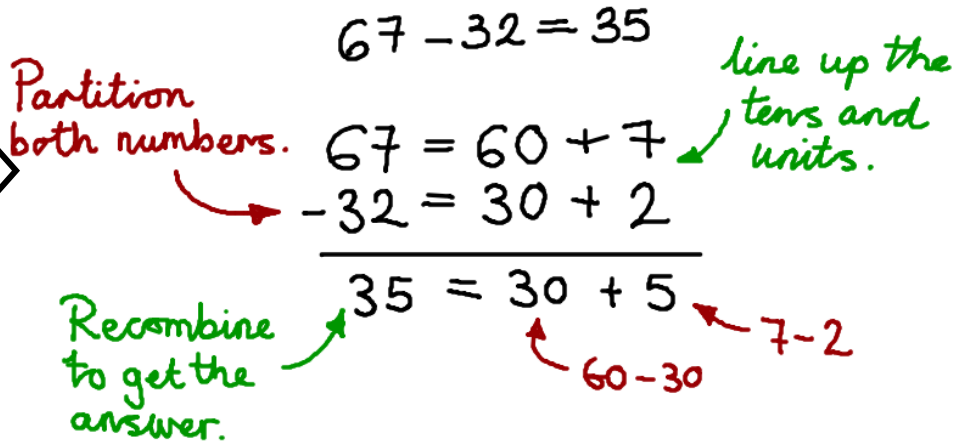


Note: Counting back is not always the most efficient method when the numbers are closer together.

Leading to:

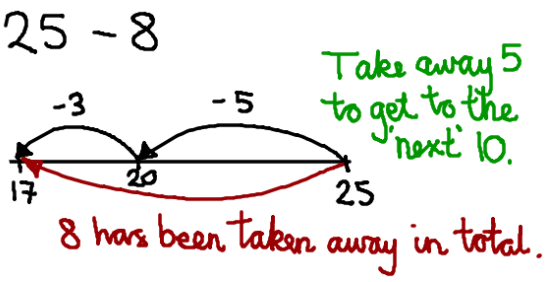
The Expanded Method of Subtraction.

Partitioning both numbers leads to the opportunity to use more formal methods of subtraction.



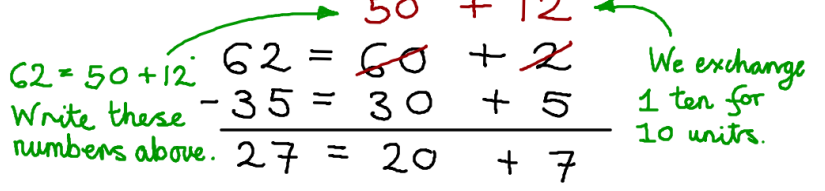
Strategies to support:

Subtracting to get to the next ten or hundred simplifies the subtraction.



Next Steps:

The Expanded Method of Subtraction **with carrying.**



Mental Subtraction at Stage 3

Children should be able to recall:

- Subtraction facts for all numbers to 20 drawing on knowledge of inverse relationship.
  E.g. 17 - 9

- Differences of multiples of 10.
  E.g. 120 - 90

- Pairs of two-digit numbers with a total of 100.
  E.g. 32 + ? = 100

Working mentally, children should be able to:

- Add and subtract groups of small numbers.
  E.g. 5 - 3 + 2

- Subtract a two-digit number from a multiple of 10.
  E.g. 90 - 27

- Subtract two-digit numbers.
  E.g. 68 - 35

Children should know when to:

- Partition: Count back in tens and ones to find the difference.

- Partition: Subtract 10 or 20 and adjust.

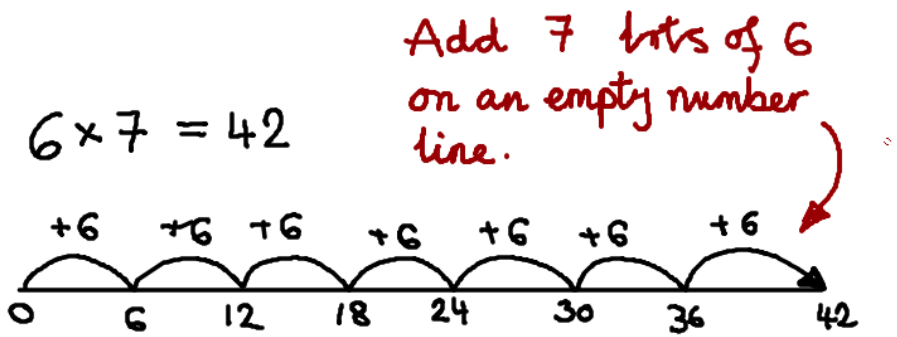
- Count back in minutes and hours bridging through 60.

Written Multiplication at Stage 3

Method:

Repeated addition using a number line.

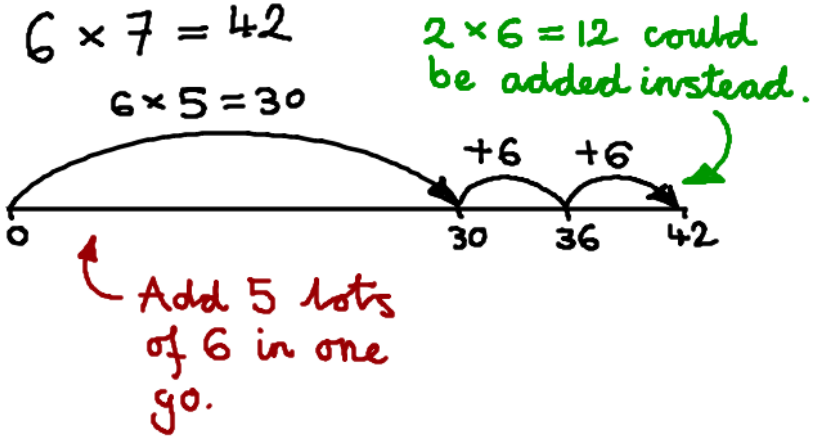
Understanding multiplication as repeated addition is key to understanding formal methods of multiplication.



Leading to:

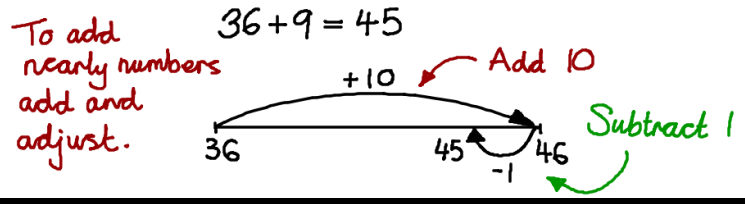
Repeated addition using times table facts.

By using known times table facts shortcuts can be taken to reduce the number of steps to multiply.



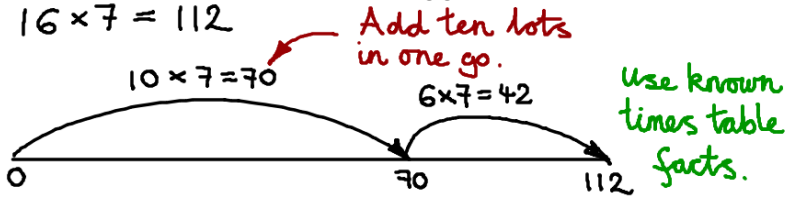
Strategies to support:

Adding 'nearly' numbers using compensating.



Next Steps:

Using multiplication of multiples of 10 allows bigger numbers to be multiplied.



Mental Multiplication at Stage 3

Children should be able to recall:

- Multiplication facts for the 2, 5 and 10 times table

- Multiplication facts for the 3, 4 and 6 times tables

- Doubles of multiples of 10 to 100.
  E.g. Double 90

Working mentally, children should be able to:

- Double any multiple of 5 up to 100.

- Multiply one-digit or two-digit numbers by 10
  E.g. 7 x 10, 46 x 10

- Multiply one-digit or two-digit numbers by 100
  E.g. 7 x 100 46 x 100

Children should know when to:

- Partition: when doubling, double the tens and units separately then recombine.

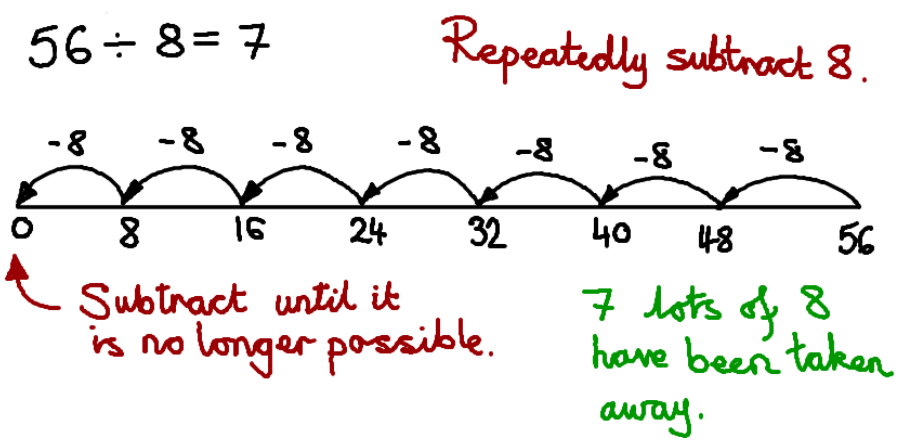
- Use knowledge that halving and doubling are inverse operations.

- Recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero can be used as a place holder.

Written Division at Stage 3

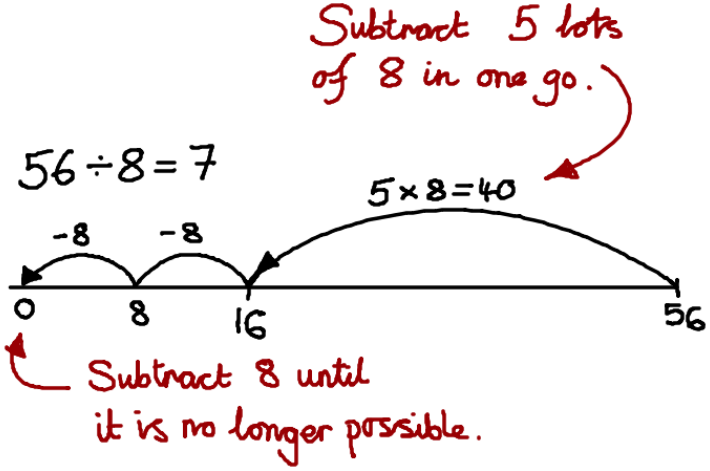
Repeated subtraction using a number line.

Understanding division as repeated subtraction is key to understanding formal methods of division.



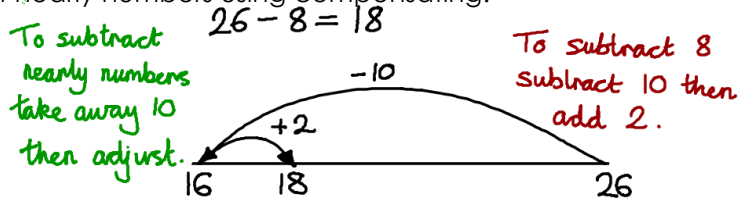
Repeated subtraction using times table facts.

By using known times table facts shortcuts can be taken to reduce the number of steps needed to divide.



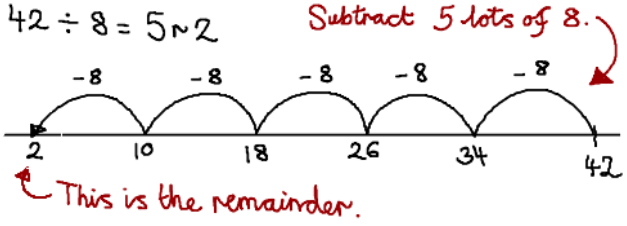
Strategies to support:

Subtract nearly numbers using compensating.



Next Steps:

Division with remainders.



Mental Division at Stage 3

Children should be able to recall:

- Corresponding division facts for the 2, 5 and 10 times tables.

- Corresponding division facts for the 3, 4 and 6 times tables.

- Halves of multiples of 10 and 100.
  E.g. Half of 90

Working mentally, children should be able to:

- Halve any multiple of 10 up to 200.
  E.g. Halve 170

- Find unit fractions of numbers and quantities involving halves, thirds, quarters, fifths and tenths,

Children should know when to:

- Partition: when halving, halve the tens and units separately, then recombine.

- Use knowledge that halving and doubling are inverse operations.

- Recognise that finding a unit fraction is equivalent to dividing by the denominator and use of division facts.

How we teach it.

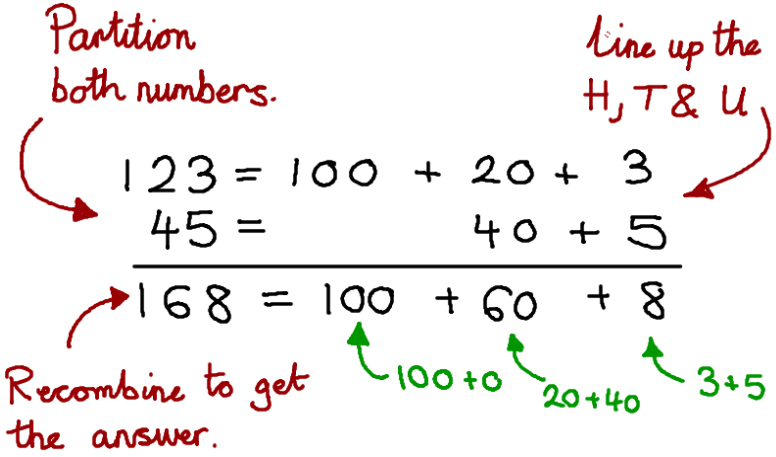
Written and mental calculation at Stage 4

Written Addition at Stage 4

Method:

The Expanded Method of Addition.

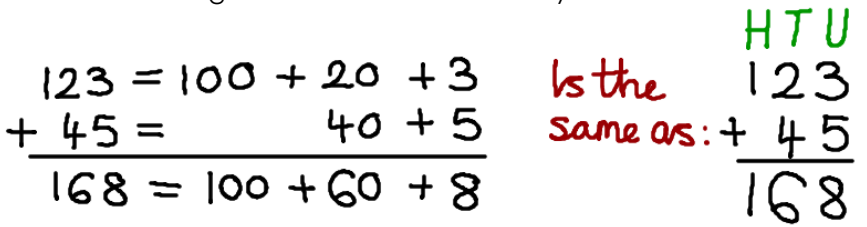
Partitioning two numbers on top of each other allows numbers to be added easily. Children need to ensure that the Hundreds, Tens and Units are lined up correctly.



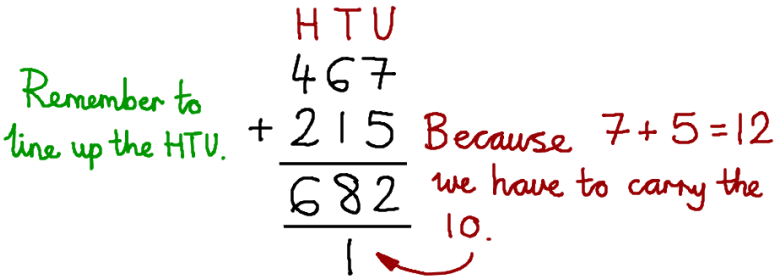
Leading to:

Column Addition

In Year 4 Column Addition will be taught alongside the Expanded Method to encourage children to see how they relate.

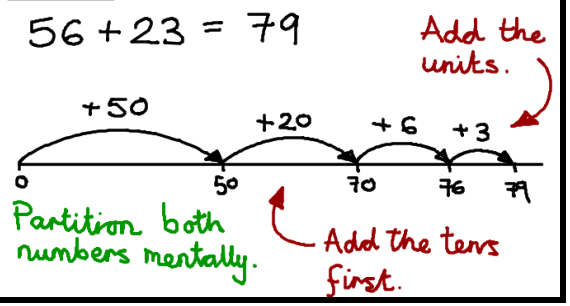


Column Addition with carrying



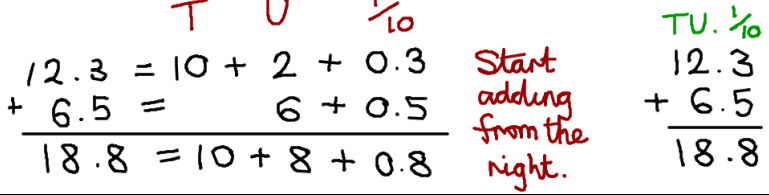
Strategies to support:

Written addition using a number line.



Next Steps:

Adding **decimals** using Column Addition and the Expanded Method.



Mental Addition at Stage 4

Children should be able to recall:

- Sums of pairs of multiples of 10, 100 or 1000.
- Pairs of fractions that total one.

- Addition doubles of numbers 1 to 100.
  E.g. 38 + 38

- What must be added to any three digit number to make the next multiple of 100.
  E.g. 521 + ? = 600

Working mentally, children should be able to:

- Add any pair of two-digit numbers including crossing the 10 and 100 boundary.
  E.g. 47 + 58

- Add a near multiple of 10.
  E.g. 56 + 29 = 56 + 30 - 1
- Add near doubles of two-digit numbers.
  E.g. 38 + 37

- Add two-digit or three-digit multiples of 10
  E.g. 120 + 140

Children should know when to:

- Count on in hundreds tens or ones.
- Partition: add tens and units separately then recombine.

- Partition: Add a multiple of 10 and adjust.
  E.g. 56 + 29 = 56 + 30 - 1
- Partition: Double and adjust.
  E.g. 38 + 37 = 38 + 38 - 1

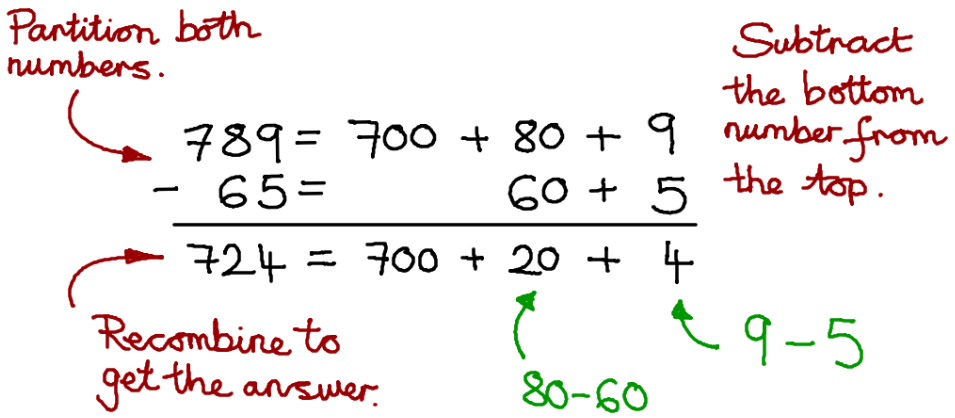
- Use knowledge of place value and related calculations.
  E.g. Work out 140 + 150 using 14 + 15 = 29
- Partition: Count on in minutes and house, bridging through 60.

Written Subtraction at Stage 4

Method:

The Expanded Method of Subtraction.

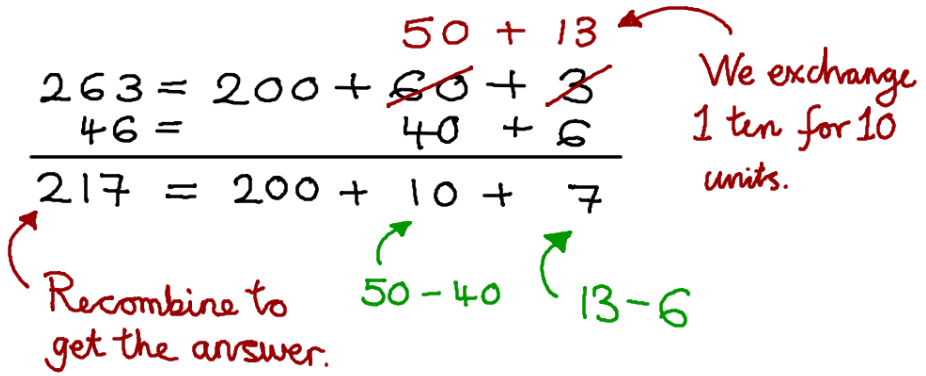
Looking very similar to addition, the Expanded Method of Subtraction affords the ability to subtract large numbers.



Leading to:

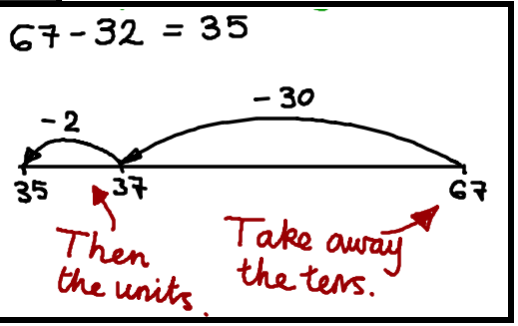
The Expanded Method of Subtraction with borrowing.

Difficulties arise when the number on top has digits which are smaller than the number below. Borrowing using the expanded method leads directly into Column Subtraction.



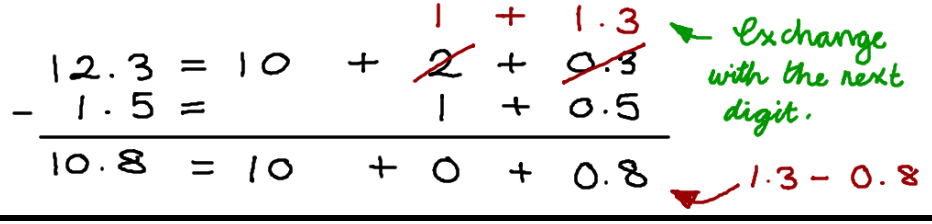
Strategies to support:

Partitioning the smaller number and counting back from the larger number using a number line to help.



Next Steps:

Subtracting **decimals** using the Expanded Method.



Mental Subtraction at Stage 4

Children should be able to recall:

- Differences of pairs of multiples of 10, 100 or 1000.

- Halves of numbers 1 to 100.
  E.g. Halve 56

- What must be added to any three digit number to make the next multiple of 100.
  E.g. 521 + ? = 600

Working mentally, children should be able to:

- Subtract any pair of two-digit numbers including crossing the 10 and 100 boundary.
  E.g. 91 - 35

- Subtract a near multiple of 10.
  E.g. 36 - 19 = 36 - 20 + 1

- Subtract two-digit or three-digit multiples of 10
  E.g. 370 - 180

Children should know when to:

- Count back in hundreds tens or ones.
- Subtract by counting up from the smaller number.

- Partition: subtract tens and units.
  E.g. Subtracting 27 by subtracting 20 then 7.
- Partition: Subtract a multiple of ten then adjust.

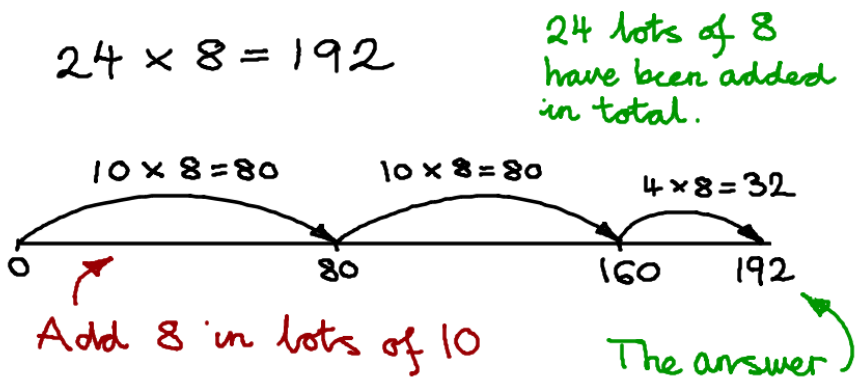
- Use knowledge of place value and related calculations.
  E.g. 290 - 150 using 29 - 15 = 14
- Partition: Count back in minutes and hours, bridging through 60.

Written Multiplication at Stage 4

Method:

Repeated addition using times table facts.

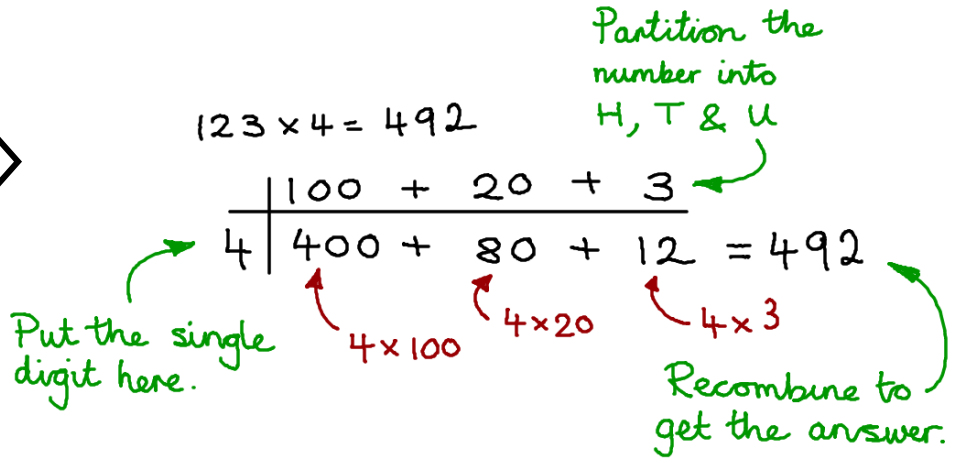
Using a number line and knowledge of multiplication of multiples of 10 allows efficient adding using a number line.



Leading to:

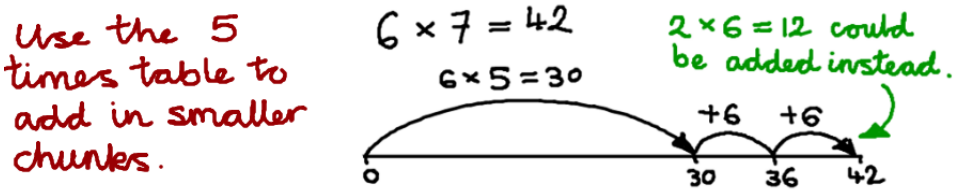
The Grid Method of Multiplication.

Setting out the steps using a number line in a more formal way leads to the Grid Method of Multiplication.



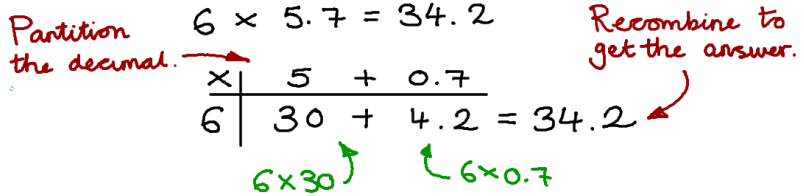
Strategies to support:

Use lower times tables to add in smaller chunks.



Next Steps:

Multiplication of **simple decimals** by a single digit.



Mental Multiplication at Stage 4

Children should be able to recall:

- Multiplication facts to 10 x 10.
- Doubles of numbers 1 to 100.
  E.g. Double 58.

- Doubles of multiples of 10 and 100.
  E.g. Double 50, Double 200.

- Factor pairs for known multiplication facts.

Working mentally, children should be able to:

- Double any two-digit number.
  E.g. Double 39
- Double any multiple of 10 or 100.
  E.g. Double 340, Double 800.

- Multiply numbers to 1000 by 10 and then 100.
- Multiply a multiple of 10 by a single-digit number.
  E.g. 40 x 3

- Multiply numbers to 20 by a single-digit number.
  E.g. 17 x 3
- Give the factor pair associated with a multiplication fact.
  E.g. 6 has the factor pair 2 and 3

Children should know when to:

- Partition: Double the tens and ones separately then recombine.

- Use understanding that when a number is multiplied by 10 or 100, its digits move one or two places to the left.
- Use knowledge of multiplication facts and place value.
  E.g. 7 x 8 = 56, 70 x 8 = 560

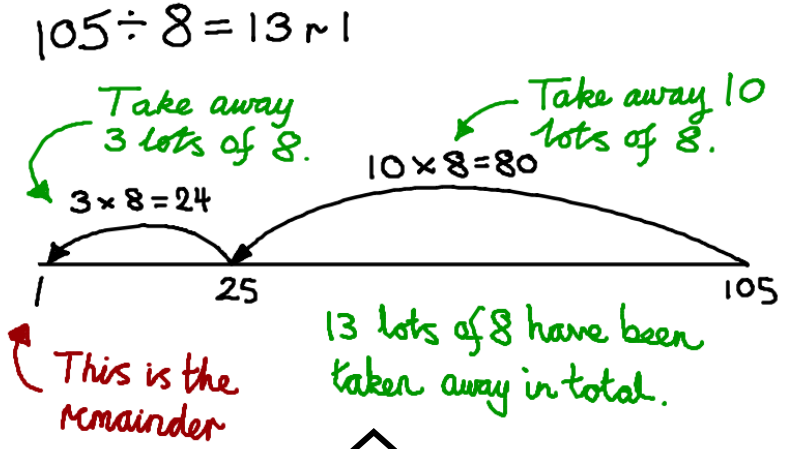
- Use partitioning and the distributive law to multiply.
  E.g.13 x 4 = (10 x 4) + (3 x 4)
  = 40 + 12

Written Division at Stage 4

Method:

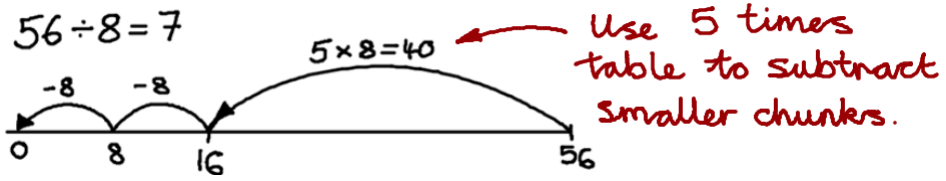
Repeated subtraction using times table facts.

Using known times table facts allows children to subtract larger 'chunks' from the original number. Children will be performing division where there are remainders.



Strategies to support:

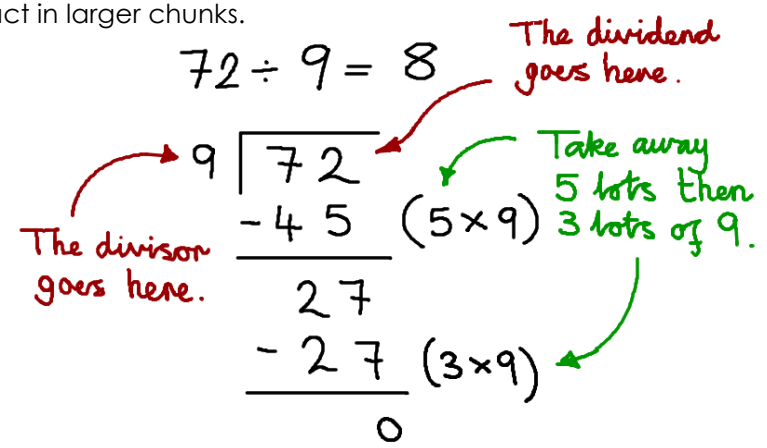
Use lower times tables to subtract in smaller chunks.



Leading to:

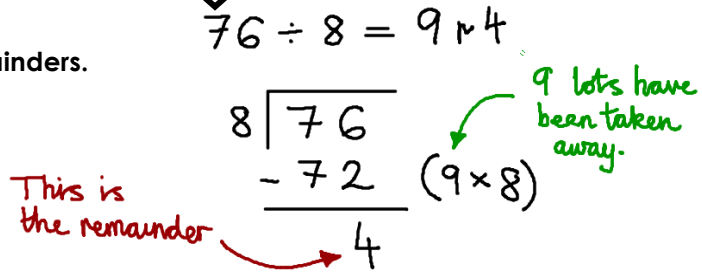
Chunking using times table facts.

Once children are comfortable with division as repeated subtraction they can start to use more a more formal layout. When children are comfortable with the layout they can begin to use their ten times table to subtract in larger chunks.



Next Steps:

Chunking with **remainders.**



Mental Division at Stage 4

Children should be able to recall:

- Corresponding division facts of times tables up to 10 x 10.
- Halves of numbers to 100.

- Halves of multiples of 10 and 100.

- Fraction and decimal equivalents of one-half, quarters, tenths and hundredths.
  E.g. $^{3}/_{10}$ is 0.3 and $^{3}/_{100}$ is 0.03

Working mentally, children should be able to:

- Halve multiples of 10 and 100.
- Halve any even number to 200.

- Find unit fractions and simple non-unit fractions of numbers and quantities.
  E.g. $^{3}/_{8}$ of 24

- Divide numbers to 1000 by 10 and then 100.
  E.g. 600 ÷ 100, 850 ÷ 10
- Identify the remainder when dividing by 2, 5 or 10.

Children should know when to:

- Partition: halve the tens and units separately then recombine.

- Use understanding that when a number is divided by 10 or 100, its digits move one or two places to the right.

- Use knowledge of multiplication facts and place value.
  E.g. 56 ÷ 7 = 8, 560 ÷ 70 = 8

How we teach it.

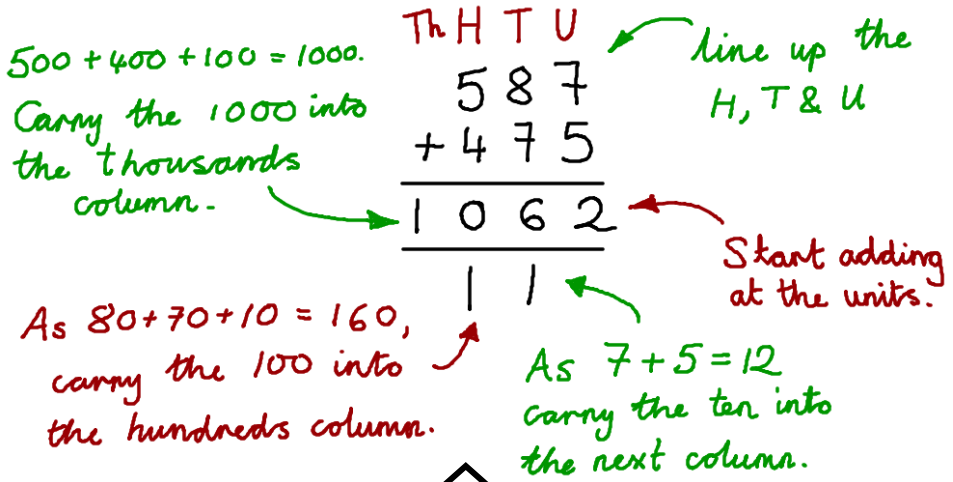
Written and mental calculation at Stage 5

Written Addition at Stage 5

Method:

Column Addition

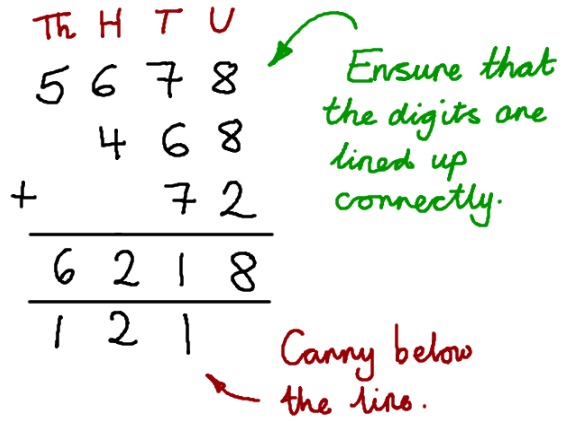
Children will be expected to become familiar with using formal methods of addition with and without carrying.



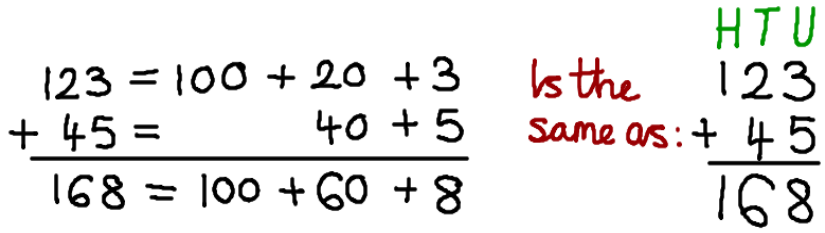
Leading to:

Column Addition.

By the end of Year 5 children should be comfortable with using column addition to add 4 digit numbers and several numbers with different numbers of digits at the same time.

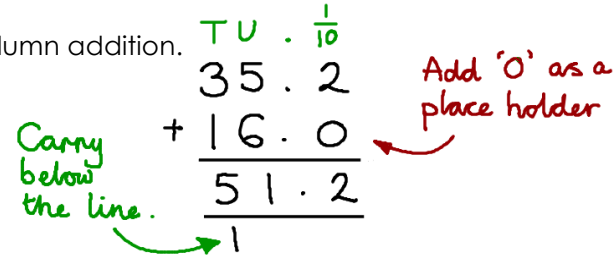


Strategies to support:



Next Steps:

Adding **decimals** using column addition.



Mental Addition at Stage 5

Children should be able to recall:

- Sums of decimals.
  E.g. 6.5 + 2.7
- Doubles of decimals.
  E.g. Double 3.4

- What must be added to any four digit number to make the next multiple of 1000.
  E.g. 4087 + ? = 5000

- What must be added to a decimal with units and tenths to make the next whole number.
  E.g. 7.2 + ? = 8

Working mentally, children should be able to:

- Add a pair of two digit numbers or three-digit multiples of 10.
  E.g. 38 + 86, 620 + 380

- Add a near multiple of 10 or 100 to any two-digit or three digit number.
  E.g. 235 + 198

- Add any pair of decimal fractions each with units and tenths.
  E.g. 5.7 + 2.5

Children should know when to:

- Count on in hundreds tens, ones and tenths.
- Partition: Add hundreds, tens or ones separately, then recombine.

- Add a multiple of 10 or 100 and adjust.
  E.g.235 + 198 = 235 + 200 - 2
- Partition: Double and adjust.

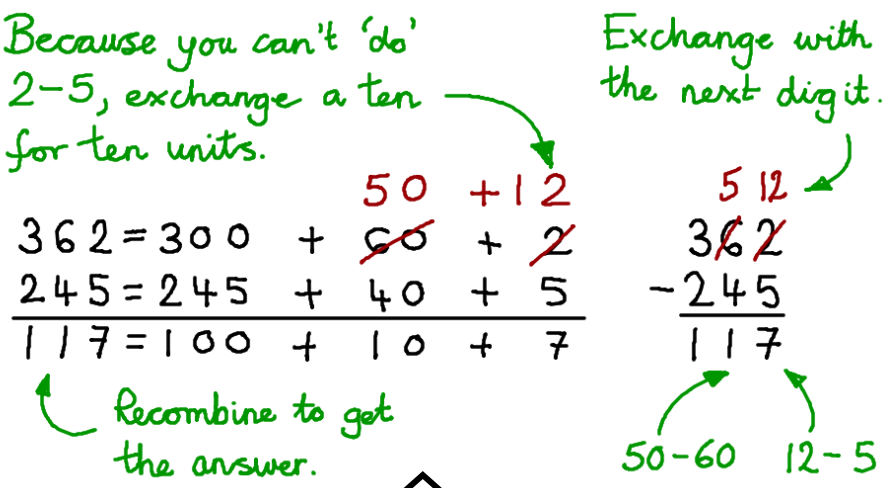
- Use knowledge of place value and related calculations.
  E.g. 6.3 + 4.8 using 63 + 48
- Partition: Count on in minutes and hours, bridging through 60.

Written Subtraction at Stage 5

Method:

The Expanded Method of Subtraction and Column Subtraction.

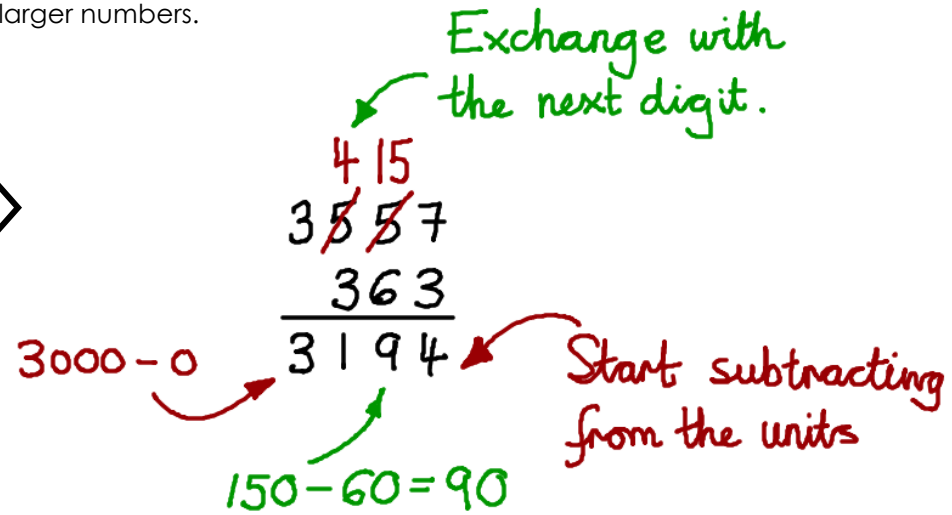
The expanded method of addition will be taught alongside Column Subtraction to allow children to see how each relates to the other.



Leading to:

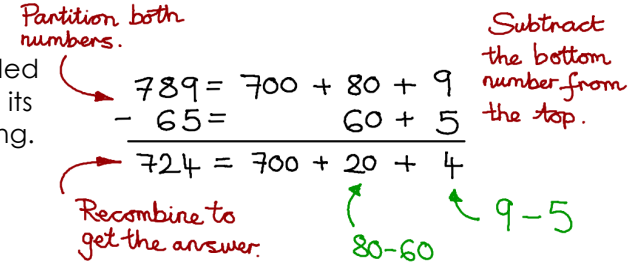
Column Subtraction.

Children will move on to using Column Subtraction on its own and with larger numbers.



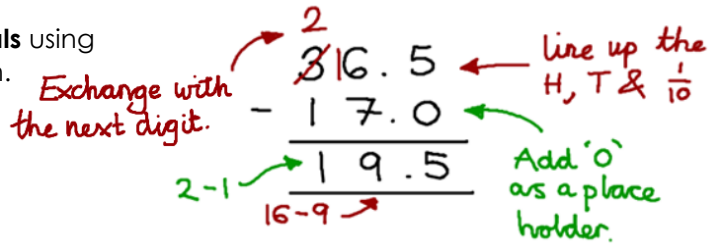
Strategies to support:

Practise using the expanded method of subtraction on its own and without borrowing.



Next Steps:

Subtracting **decimals** using Column Subtraction.



Mental Subtraction at Stage 5

Children should be able to recall:

- Differences of decimals.
  E.g. 7.8 - 1.3
- Halves of decimals.
  E.g. Half of 5.6

- What must be added to any four digit number to make the next multiple of 1000.
  E.g. 5000 - 4087 = ?

- What must be added to a decimal with units and tenths to make the next whole number.
  E.g. 8 - 7.2 = ?

Working mentally, children should be able to:

- Subtract pair of two digit numbers or three-digit multiples of 10.
  E.g. 620 - 380, 62 - 38

- Subtract a near multiple of 10 or 100 to any two-digit or three digit number.
  E.g. 235 - 198
- Find the difference between near multiples of 100 or 1000.
  E.g. 607 - 588, 6070 - 4087

- Subtract any pair of decimal fractions each with units and tenths.
  E.g. 5.7 - 2.5

Children should know when to:

- Count back in hundreds tens, ones and tenths.
- Subtract by counting up from the smaller to the larger number.

- Subtract a multiple of 10 or 100 and adjust.
  E.g. 280 - 98 = 280 - 100 + 2

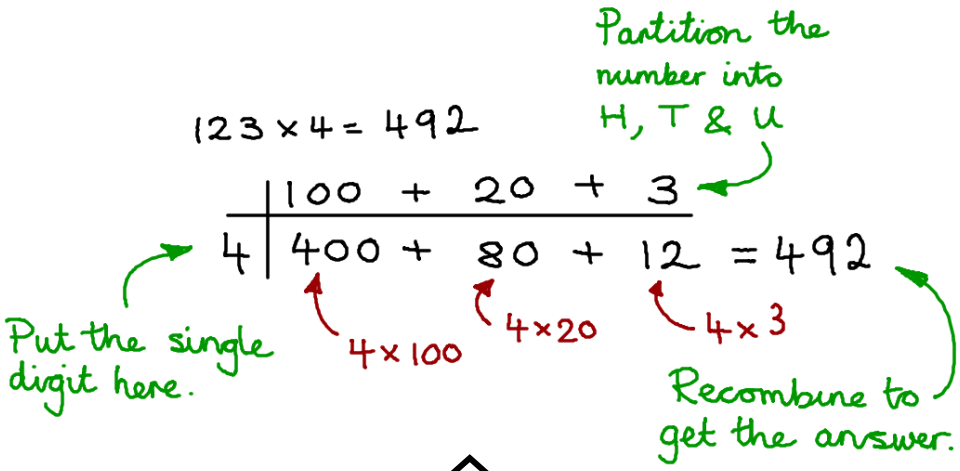
- Use knowledge of place value and related calculations.
  E.g. 6.3 - 4.8 using 63 -48
- Partition: Count back in minutes and hours, bridging through 60.

Written Multiplication at Stage 5

Method:

The Grid Method of Multiplication.

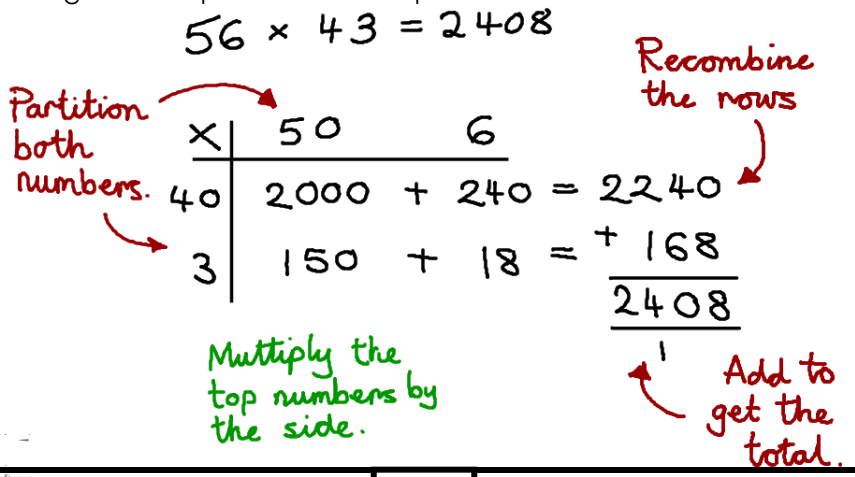
Children will continue to use the Grid Method of Multiplication when multiplying a single digit by a larger number.



Leading to:

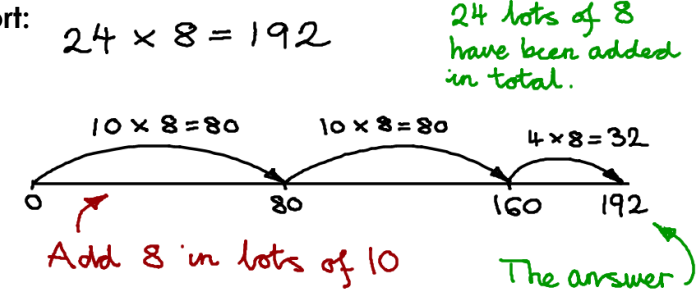
Multiplying larger numbers using the Grid Method.

Children will go on to multiply 2-digit by 2-digit numbers using the Grid Method. Children need to be secure in their place value and knowledge of multiplication of multiples of 10 and 100.



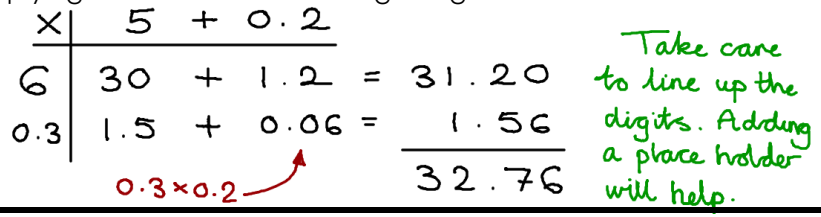
Strategies to support:

Using repeated addition on a number line.



Next Steps:

Multiplying **decimal numbers** using the grid method.



Mental Multiplication at Stage 5

Children should be able to recall:

- Squares to 10 x 10.

- Factor Pairs to 100.
  E.g. 30 has the factor pairs 1 x 30, 2 x 15, 3 x 10 and 5 x 6

Working mentally, children should be able to:

- Multiply two-digit numbers by 4 or 8.
  E.g. 26 x 4
- Multiply two-digit numbers by 5 or 20.
- Multiply by 25 or 50.

- Double three-digit multiples of 10 to 500.
- Multiply whole numbers and decimals by 10, 100 or 1000.
  E.g. 4.3 x 10, 0.75 x 100

- Multiply pairs of multiples of 10 and a multiple of 100 by a single-digit number.
  E.g. 60 x 30, 900 x 8

Children should know when to:

- Multiply by 4 or 8 by repeated doubling.
- Form an equivalent calculation.
  E.g. To multiply by 5, multiply by 10 then halve. To multiply by 20, double and then multiply by 10.

- Use knowledge of doubles and halves and understanding of place value.
  E.g. When multiplying by 50, multiply by 100 then divide by 2.
- Use knowledge of multiplication and place value when calculating with multiples of 10.
  E.g. 60 x 7 using 6 x 7

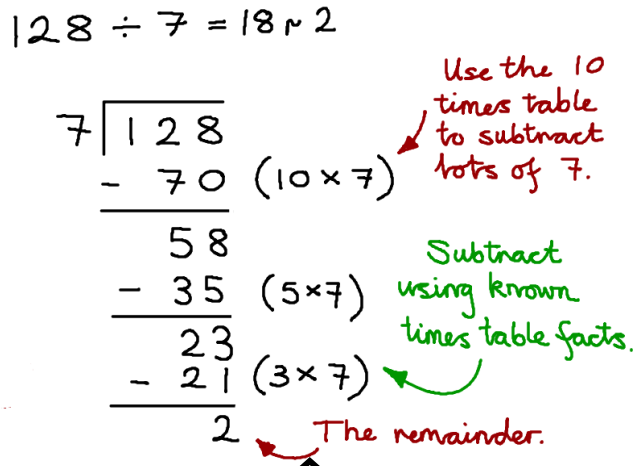
- Use understanding that when a number is multiplied by 10 or 100 its digits move one or two places relative to the decimal point and zero is used as a place holder.

Written Division at Stage 5

Method:

Chunking using times table facts.

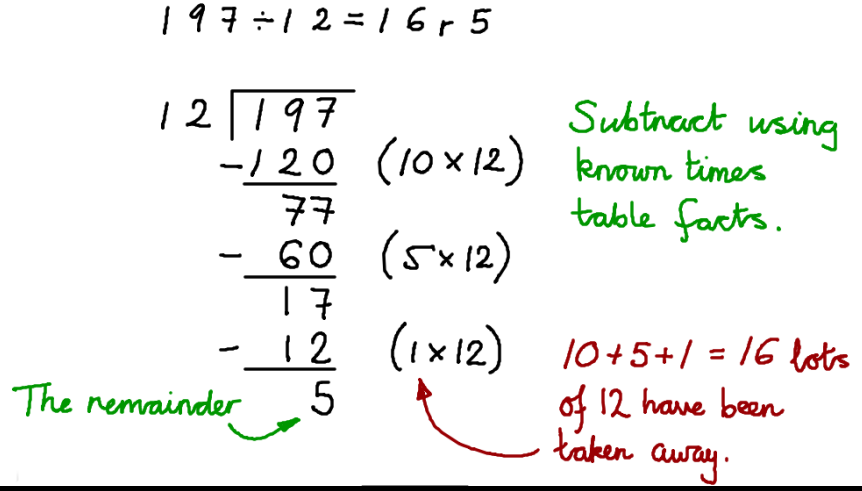
Children will continue to explore division as repeated subtraction. They will use their increasing knowledge of times tables to subtract in larger chunks.



Leading to:

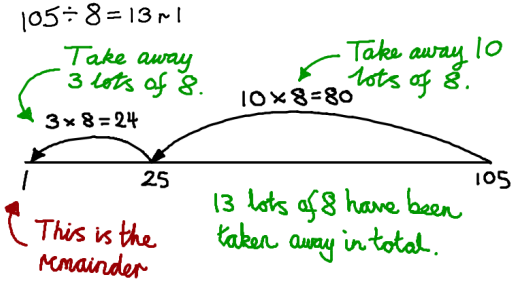
Chunking using times table facts and multiples of 10.

Using their knowledge of the 10 times table will allow children to divide larger numbers by two-digit numbers while reducing the number of steps.



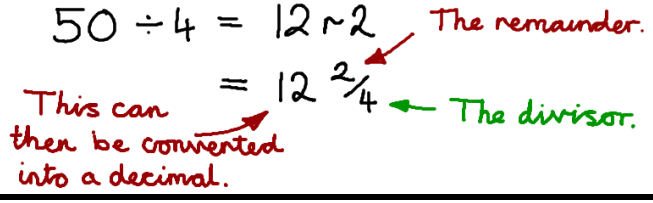
Strategies to support:

Using **repeated subtraction** on a number line.



Next Steps:

Expressing the remainder as a fraction.



Mental Division at Stage 5

Children should be able to recall:

- Division facts corresponding to tables up to 10 x 10 and the related unit fractions.
  E.g. 7 x 9 = 63 so one-ninth of 63 is 7 and one-seventh of 63 is 9.

- Percentage equivalents of one-half, one-quarter, three quarters, tenths and hundredths.

- Factor Pairs to 100 and corresponding division facts.
  E.g. 30 ÷ 5 = 6, 30 ÷ 6 = 5 using 5 x 6 = 30

Working mentally, children should be able to:

- Divide two-digit numbers by 4 or 8.
- Halve three-digit multiples of 10 to 1000.
  E.g. 760 ÷ 2

- Find the remainder after dividing a two-digit number by a single-digit number.
  E.g. 27 ÷ 4 = 6 r 3
- Divide whole numbers and decimals by 10, 100 or 1000.
- Divide a multiple of 10 by a single-digit number (whole number answers)
  E.g. 270 ÷ 3

- Find fractions of whole numbers or quantities.
  E.g. $^{2}/_{3}$ of 27, $^{4}/_{5}$ of 70 kg
- Find 50%, 25% or 10% of whole numbers of quantities.
  E.g. 25% of 20 kg, 10% of £10

Children should know when to:

- Divide by 4 or 8 by repeated halving.
- Use knowledge of division facts.
  E.g. when carrying out a division to find a remainder.

- Use understanding that when a number is divided by 10 or 100, its digits move one or two places to the right relative to the decimal point and zero is used as a place holder.

- Use knowledge of equivalence between fractions and percentages.
  E.g. To find 50%, 25% and 10%
- Use knowledge of division facts and understanding of place value.
  E.g. When calculating with multiples of 10.

How we teach it.

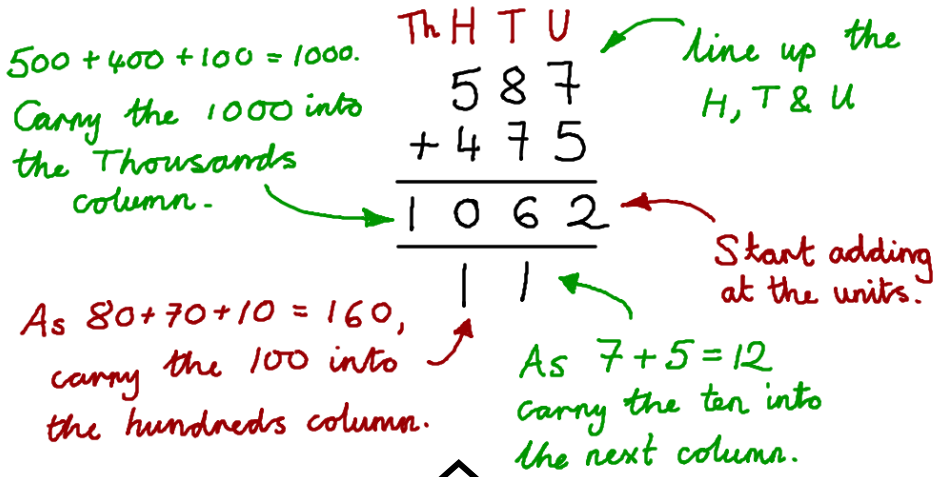
Written and mental calculation at Stage 6

Written Addition at Stage 6

Method:

Column Addition.

Children will practise using column addition to add numbers of all sizes. Secure knowledge of place value is essential.



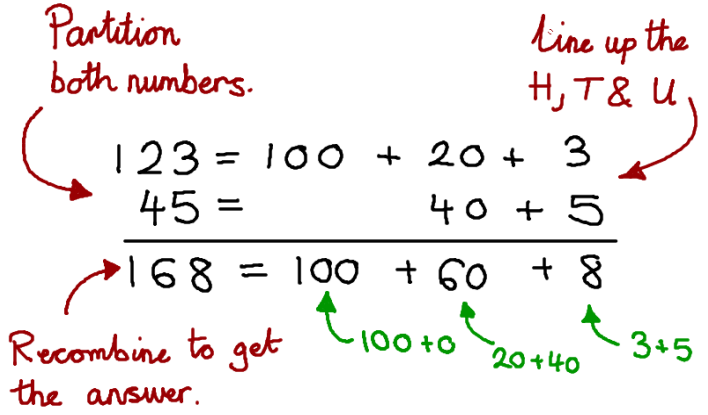
Common Mistakes to look out for:

- Make sure that the digits are lined up correctly in columns of thousands, hundreds, tens and units.
- Check that carrying is done correctly. The digit that needs to be carried must be placed in the correct column and then added in the next step.

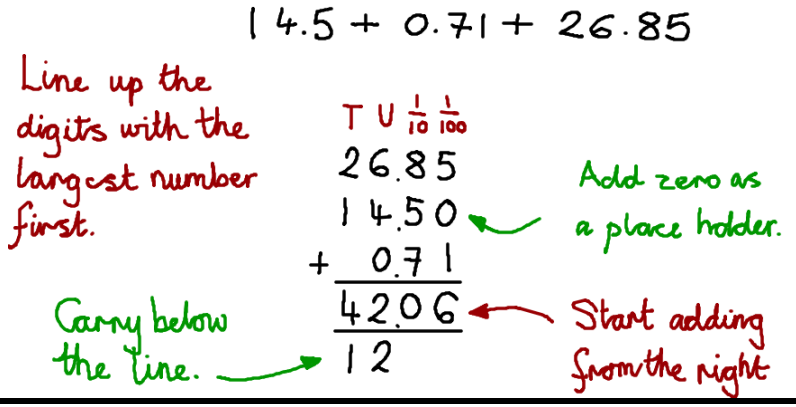
Alternative Methods:

By the end of Year 6 children will need to be secure in their knowledge of an efficient method of addition. The following methods may be of help.

The Expanded Method of Addition.



Adding several decimals.



Mental Addition at Stage 6

Children should be able to recall:

- Addition facts for multiples of 10 to 1000.
  E.g. 650 + ? = 930

- Addition facts for decimal numbers with one decimal place.
  E.g. 1.4 + ? = 2.5

- What must be added to a decimal with units, tenths and hundredths to make the next whole number,
  E.g. 7.26 + ? = 8

Working mentally, children should be able to:

- Add pairs of decimals with units, tenths or hundredths.
  E.g. 0.7 + 3.38

- Find doubles of decimals each with units and tenths.
  E.g. 1.6 + 1.6
- Add near doubles of decimals.
  E.g. 2.5 + 2.6 = 2.5 + 2.5 + 0.1

- Add a decimal with units and tenths, that is nearly a whole number.
  E.g. 4.3 + 2.9

Children should know when to:

- Count on in hundreds tens, ones and tenths and hundredths.
- Use knowledge of place value and related calculations.
  E.g. 6.8 + 4.3 using 68 + 43

- Use knowledge of place value and of doubles of two-digit numbers.
- Partition: Double and adjust.
  E.g. 1.6 + 1.7 = 1.6 + 1.6 + 0.1

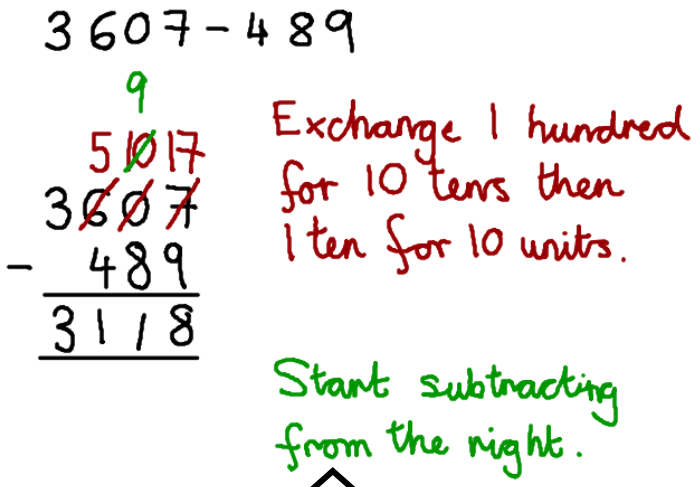
- Partition: add a whole number and adjust.
  E.g. 4.3 + 2.9 = 4.3 + 3 - 0.1
- Partition: Count on in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)

Written Subtraction at Stage 6

Method:

Column Subtraction.

Children will practise using Column methods to subtract numbers of increasing size. Secure knowledge of place value is essential.



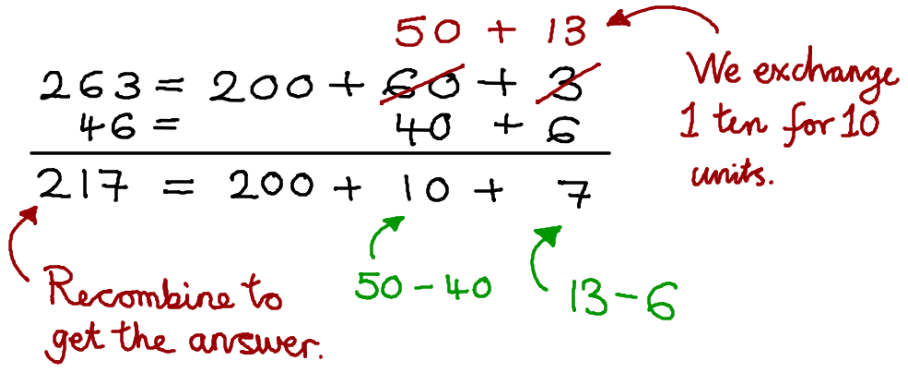
Common Mistakes to look out for.

- Children must ensure that the bottom number is subtracted from the top. If the top digit is smaller than the top digit children must exchange with the next digit.
- In some calculations, e.g. 305 - 58, children will need to exchange more than once to subtract successfully.

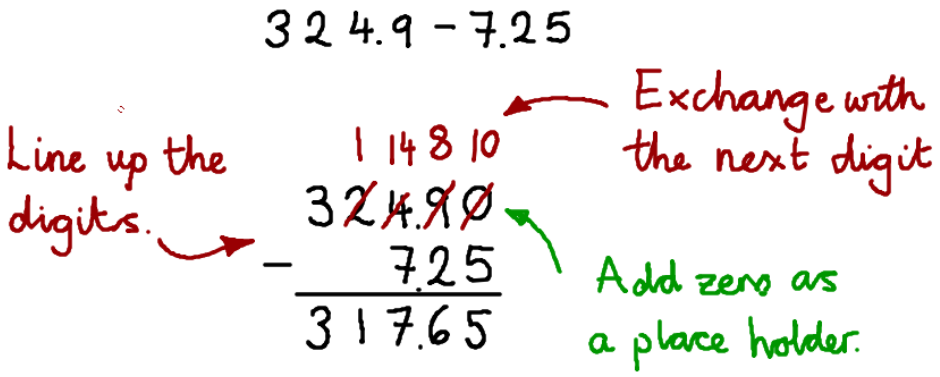
Alternative Methods.

By the end of Year 6 children will need to be secure in their knowledge of an efficient method of subtraction. The following methods may be of help.

The Expanded Method of Subtraction.



Subtraction decimals with a different number of digits.



Mental Subtraction at Stage 6

Children should be able to recall:

- Subtraction facts for multiples of 10 to 1000.
  E.g. ? - 250 = 540

- Subtraction facts for decimal numbers with one decimal place.
  E.g. ? - 1.4 = 2.5

- What must be subtracted from a decimal with units, tenths and hundredths to make the previous whole number,
  E.g. 7.26 - ? = 7

Working mentally, children should be able to:

- Subtract pairs of decimals with units, tenths or hundredths.
  E.g. 4.54 - 0.84

- Subtract a decimal with units and tenths, that is nearly a whole number.
  E.g. 6.5 - 3.8 = 6.5 - 4 + 0.2

Children should know when to:

- Count back in hundreds tens, ones and tenths and hundredths.
- Use knowledge of place value and related calculations.
  E.g. 6.8 - 4.3 using 68 - 43

- Partition: subtract a whole number and adjust.
  6.5 - 3.8 = 6.5 - 4 + 0.2

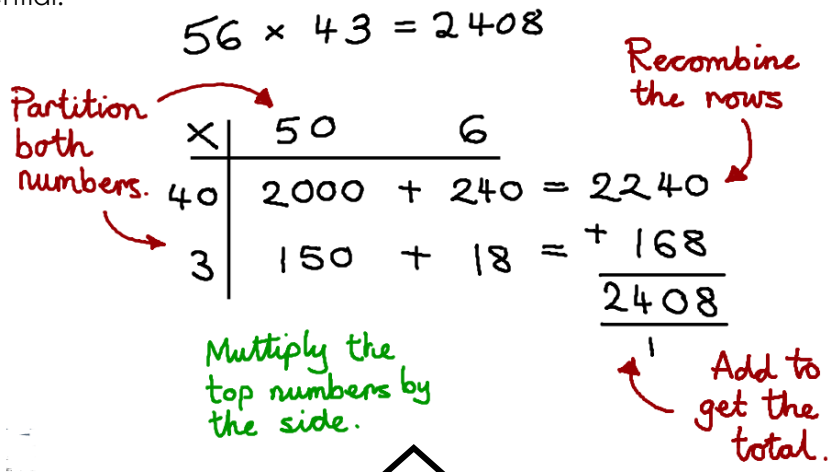
- Partition: Count back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)

Written Multiplication at Stage 6

Method:

The Column Method of Multiplication.

Children will continue to use the Grid Method to multiply larger numbers and decimals. Secure knowledge of multiplication of multiples of 10 is essential.



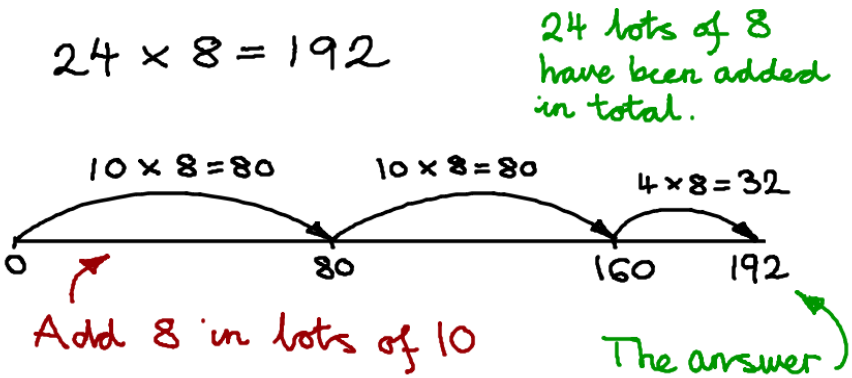
Common Mistakes to look out for.

- Check multiplication of multiples of 10 and 100 as calculations are often wrong by a factor of 10.
- Ensure that after recombining, the digits are lined up to enable column addition to proceed effectively.
- Children may need to carry when adding.

Alternative Methods.

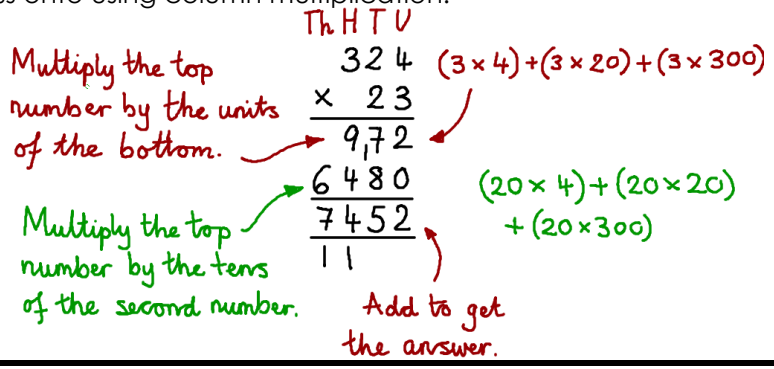
By the end of Year 6 children will need to be secure in their knowledge of an efficient method of multiplication. The following methods may be of help.

Repeated Addition using a number line.



Column Multiplication.

Once children are secure in their use of the Grid Method they may progress onto using column multiplication.



Mental Multiplication at Stage 6

Children should be able to recall:

- Squares to 12 x 12

- Squares of the corresponding multiples of 10

- Prime numbers less than 100.

Working mentally, children should be able to:

- Multiply pairs of two-digit and single-digit numbers.
  E.g. 28 x 3
- Double decimals with units and tenths.

- Multiply pairs of multiples of 10 and 100.
  E.g. 50 x 30, 600 x 20
- Multiply two-digit decimals
  E.g. 0.8 x 7

- Identify numbers with odd and even numbers of factors and no factor pairs other than 1 and themselves.

Children should know when to:

- Partition: Double the units and tenths separately and recombine.

- Use knowledge of multiplication and place value when calculating with multiples of 10 and 100.
  E.g. 60 x 70 using 6 x 7

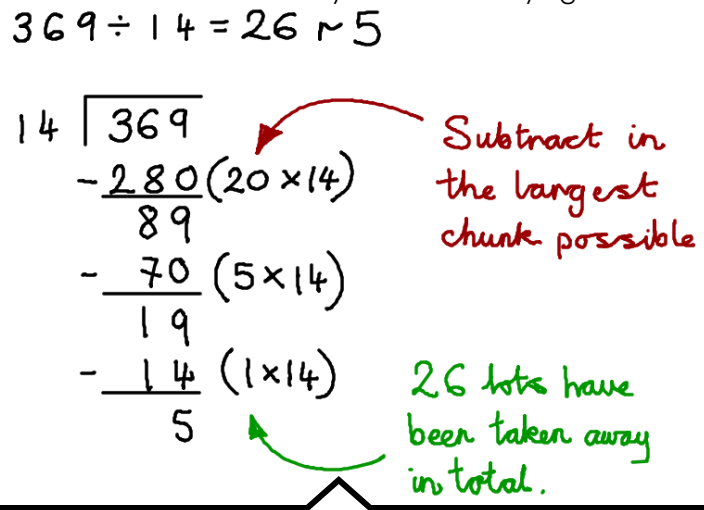
- Use knowledge of multiplication facts to identify factor pairs and numbers with only two factors.

Written Division at Stage 6

Method:

Chunking using times table facts and multiples of 10.

Children will continue to use repeated subtraction to divide. Children will use known facts and can take away chunks of varying size.



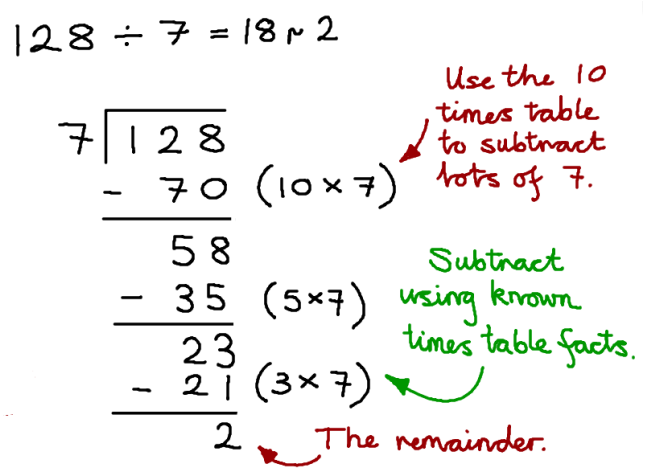
Common Mistakes to look out for.

- When subtracting children will need to ensure they have lined up the digits to allow accurate subtraction.
- Children may need to exchange when subtracting and can forget to do this.
- Ensure that the number of 'lots' subtracted are all totalled.

Alternative Methods.

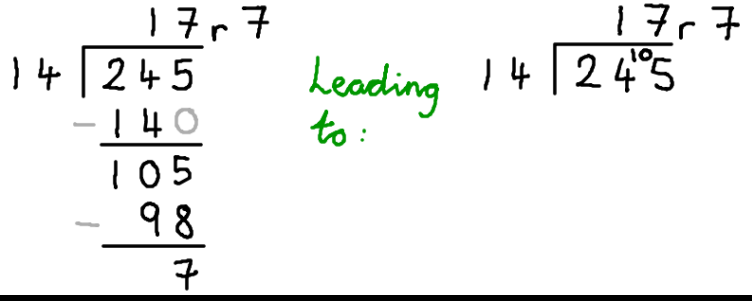
By the end of Year 6 children will need to be secure in their knowledge of an efficient method of division. The following methods may be of help.

Chunking using times table facts.



Short and long division.

Once children are secure in their understanding of division and accurate in their use of chunking they may use short and long division.



Mental Division at Stage 6

Children should be able to recall:

- Prime numbers less than 100.

- Equivalent fractions, decimals and percentages for hundredths.
  E.g. 35% is equivalent to 0.35 or $^{35}/_{100}$

Working mentally, children should be able to:

- Divide a two-digit number by a single-digit number.
  E.g. 68 ÷ 4
- Divide by 25 or 50.
  E.g. 480 ÷ 25

- Halve decimals with units and tenths.
  E.g. Half of 15.2
- Divide multiples of 100 by a multiple of 10 or 100 (Whole number answers).
  E.g. 600 ÷ 20, 800 ÷ 400
- Divide two-digit decimals.
  E.g. 4.8 ÷ 6

- Find 10% or multiples of 10% of whole numbers and quantities.
  E.g. 30% of 50 ml
- Simplify fractions by cancelling.
- Scale up and down using known facts.
  E.g. Given that three oranges cost 24p, find the cost of four oranges.

Children should know when to:

- Partition: Use partitioning and the distributive law to divide tens and ones separately.
  92 ÷ 4 = (80 + 12) ÷ 4
- Form an equivalent calculation.
  E.g. To divide by 25 divide by 100 then 4.

- Use knowledge of equivalence between fractions and percentages and the relationship between fractions and division.

- Recognise how to scale up or down using multiplication and division.
  E.g. If three oranges cost 24p, one orange costs 24 ÷ 3 = 8p