Calculations Policy

Halewood C of E Primary Academy

2024

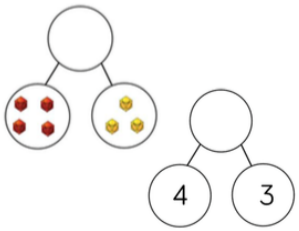
Year 1

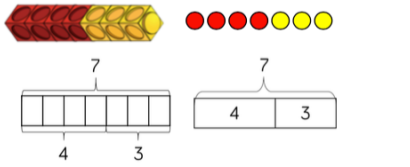
Times tables to be taught: Counting in 2's, 5's and 10's

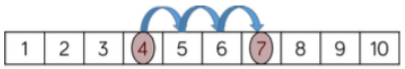
Addition

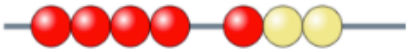
Skill: Add one-digit numbers within 10

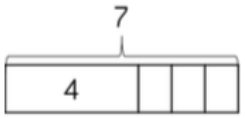
$4 + 3 = 7$

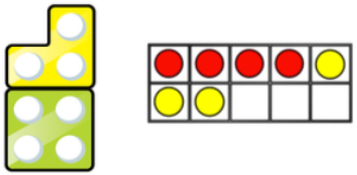










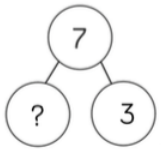


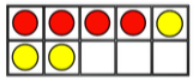
Subtraction

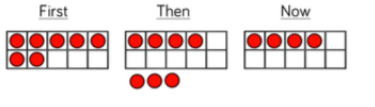
Skill: Subtract one-digit numbers within 10

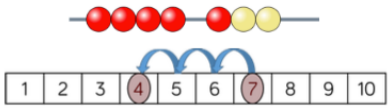
Part whole models, ten frames and number shapes support partitioning.

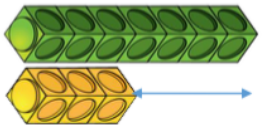
$7 - 3 = 4$









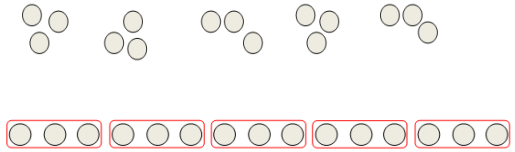


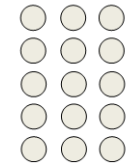
Multiplication

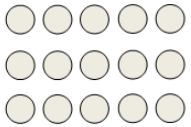
Skill: Multiplying a one-digit number by a one-digit number O x O

Begin to record multiplication as an array.

Arrays and repeated addition



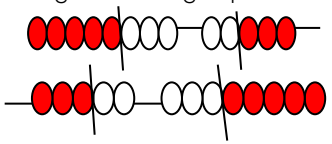




Children can then be introduced to the image of a rectangular array, initially through real items such as egg boxes, baking trays, ice cube trays, wrapping paper etc. and using these to show that counting up in equal groups can be a quicker way of finding a total.

Children also understand that multiplication is commutative:
3 x 5 is the same as 5 x 3
Teacher can:

- Use a number line when problem solving.
- Use practical equipment, such as bead strings to model groups.



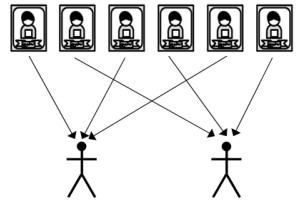
Division

Skill: Divide a one-digit number by a one-digit number O ÷ O

6÷2=

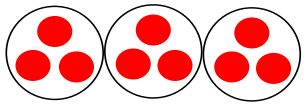
Language to be used:
How many groups of 2 in 6?
What is 6 shared by 2?

Equal sharing (6 shared equally between 2)



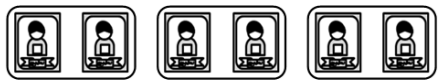
6 football stickers are shared equally between 2 people, how many do they each get? Children may solve this by using a 'one for you, one for me' strategy until all of the stickers have been given out.

9 sweets are shared out between 3 children. How many sweets do they get each?



Equal grouping (How many groups of 2 are there in 6?)

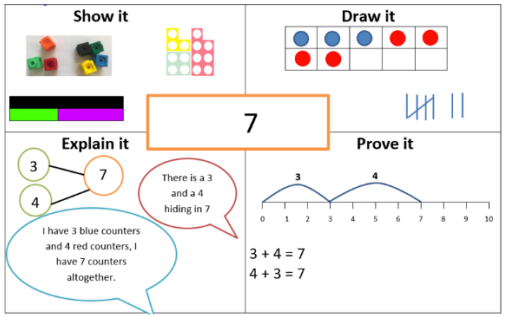
There are 6 football stickers, how many people



can have 2 stickers each?

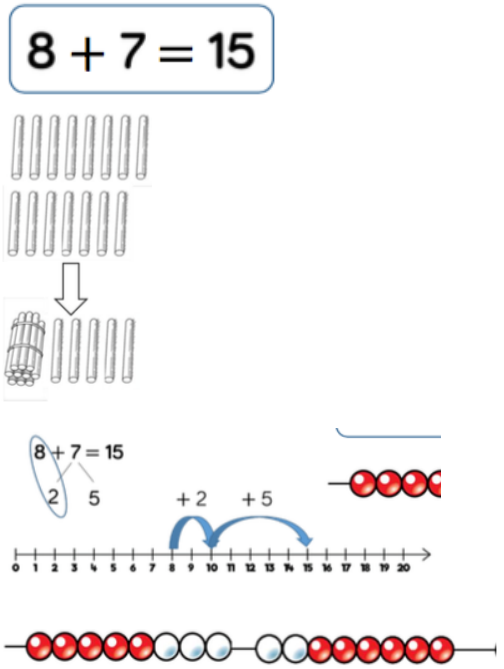
Also through practical exploration

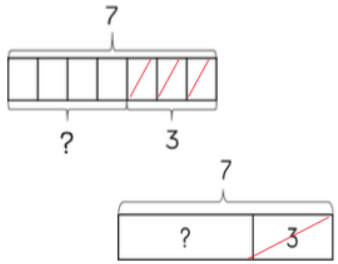
Skill: Divide two-digit number by a one-digit number TO÷O



Skill: Add 1 and 2-digit numbers to 20
When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

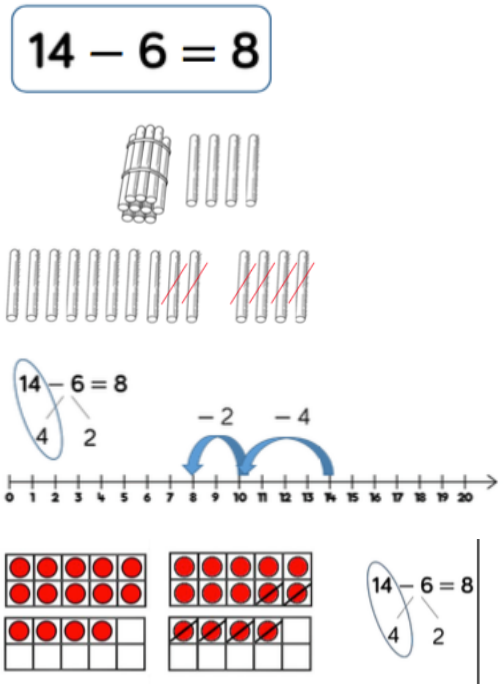
Different manipulatives can be used to represent the exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.





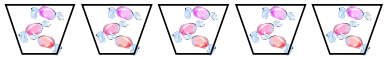
Skill: Subtract 1 and 2-digit numbers within 20
When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are useful for this.



- 'Draw out' word problems in pictures and symbols

There are 3 sweets in one bag. How many sweets are there in 5 bags?



Also through practical exploration.

- Use of a hundred square to show patterns when counting in 2's, 5's and 10's.
- Use of tens frames to show patterns of multiplication.
- Use role-playing situations, e.g. playing shop.

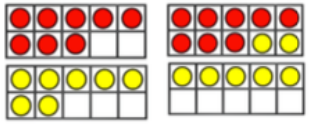
Children to know what happens to a number when multiplied by zero using visual representations to support their understanding.

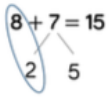
12 children get into teams of 4 to play a game. How many teams are there?

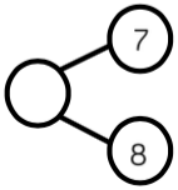
Children should draw equal groups when dividing.

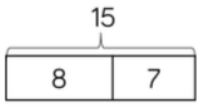
Teacher should:

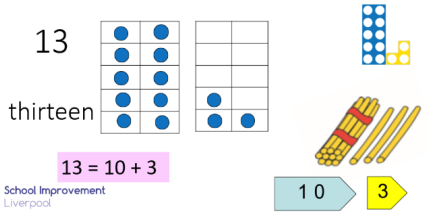
- Model finding half and a quarter of shapes
- Model finding half of an amount or object
- Use role-playing situations, e.g. playing shop

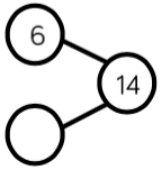


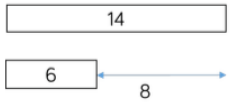


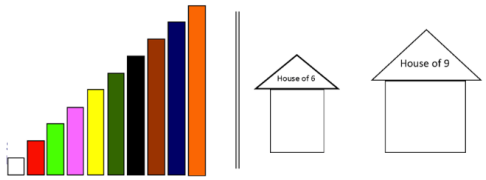












- Model number lines with missing numbers
- Model jottings appropriate for larger numbers
- Use role-playing situations, e.g. playing shop

<u>Estimation</u>

Teachers should model and introduce the skill of estimation to pupils across all four operations. What answer would be a good estimate? How do we know?

Year 2

Times table to be taught: 2, 5, and 10 Counting in 2s, 3s, 5s, 10s

Addition

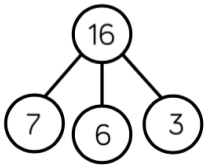
Skill: Add three 1-digit numbers

When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

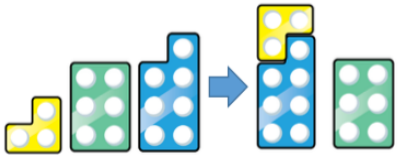
Children should use manipulatives that highlight number bonds to 10.

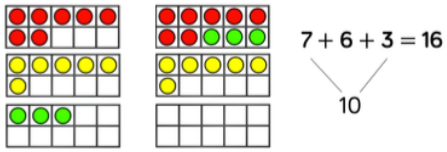
Variation and fluency

$7 + 6 + 3 = 16$



Concrete





Skill: Add 1-digit and 2-digit numbers to 100

Variation and fluency

When adding single digits to a two-digit number, children should be encouraged to count on from the larger number. They should use their knowledge of number bonds to add more efficiently. 8 + 5 = 13 so 38 + 5 = 43.

Subtraction

Skill: Subtract 1 and 2-digit numbers from 100

Estimation

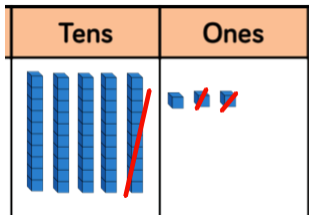
Teachers should model and introduce the skill of estimation to pupils across all four operations. What answer would be a good estimate? How do we know?

Variation and fluency

Without exchange:

53 – 12 = 41

Subtract tens and ones:



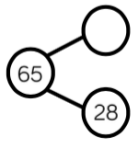
Abstract to be recorded as:

53 – 12
50 – 10 = 40
3 – 2 = 1
40 + 1 = 41

When children are secure they should progress to exchange:

Children can count on to find the difference. Children should be encouraged to jump to multiples of 10 to become more efficient.

65 – 28 = 37



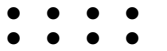
Concrete

Multiplication

Skill: Multiplying a one-digit number by a one-digit number O x O

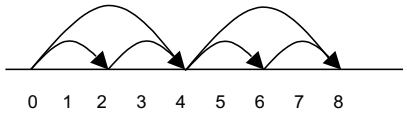
Arrays and repeated addition

Children to be shown that multiplication is commutative.

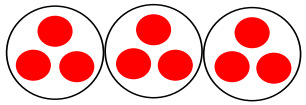


4 x 2 or 2 x 4
4 + 4

or repeated addition
2 + 2 + 2 + 2



3 x 3



Vocabulary: 'sets of' or 'lots of'.

Skill: Doubling simple 2 digit even numbers TO x O

Children to draw tens and ones representing the numbers they are doubling.
24 x 2 = 48

Children can record doubling by partitioning:

24 x 2
20 x 2 = 40
4 x 2 = 8
40 + 8 = 48

Division

Skill: Divide a one-digit number by a one-digit number. O ÷ O

Understand division as sharing and grouping

Sharing

Children to be aware of one to one correspondence when sharing into equal groups.

6 sweets are shared between 2 people. How many do they have each?

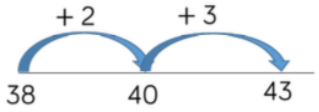
6 ÷ 2 can be modelled as:

Grouping

There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)

Skill: Divide a two-digit number by a one-digit number TO ÷ O

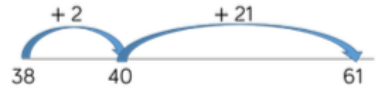
12 ÷ 3 = ? Children begin to read this calculation as:
'How many groups of 3 are there in 12?'
Using a number line, children can count their jumps.



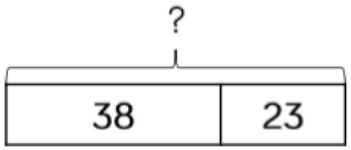
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skill: Add 2-digit numbers to 100

Variation and fluency
Children can jump to multiples of 10 to become more efficient.



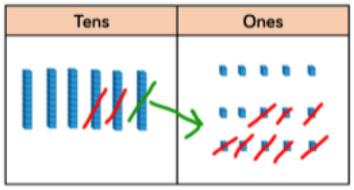
Abstract



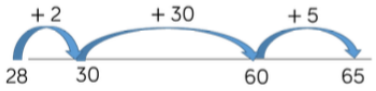
Children need to understand the concept that there can sometimes be multiple ways to achieve a correct answer.

Children should record by adding tens and adding ones:

38 + 23
30 + 20 = 50
8 + 3 = 11
50 + 11 = 61



Pictorial

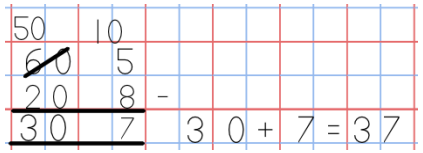


Abstract

Children can partition second number:
Children should be encouraged to apply number bonds to subtraction.

65 – 28
65 – 20 = 45
45 – 8 = 37

Expanded written method
Children can use concrete resources alongside expanded method to practise exchanging.



Children to know what happens to a number when multiplied by zero and 1 using visual representations to support their understanding.

x = signs and missing numbers

7 x 2 = □
7 x □ = 14
□ x 2 = 14
□ x ∇ = 14

□ = 2 x 7
14 = □ x 7
14 = 2 x □
14 = □ x ∇

Skill: Halving simple 2 digit even numbers

Aim to use known number facts, for example, dividing by two is the same as halving. Use the inverse operation where possible to check answers.

- Children explore halving through practical equipment.
- Model halving and quartering of objects and amounts.

Children can record halving through partitioning:

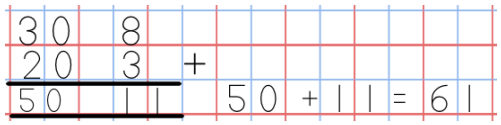
48 ÷ 2 =
40 ÷ 2 = 20
8 ÷ 2 = 4
20 + 4 = 24

÷ = signs and missing numbers

Show children that division is not commutative.

6 ÷ 2 = □
6 ÷ □ = 3
□ ÷ 2 = 3
□ ÷ ∇ = 3

□ = 6 ÷ 2
3 = 6 ÷ □
3 = □ ÷ 2
3 = □ ÷ ∇

Expanded columnar written method Alongside place value mats and manipulatives.  			

Year 3

Times table to be taught: x3, x4, x6, x8 (revise 2, 5, 10)

Addition

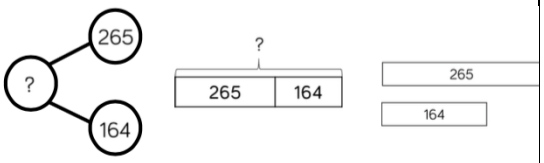
Skill: add numbers with up to 3 digits

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written method.

Estimation
Children should be encouraged and given opportunities to estimate alongside all addition calculations to increase their accuracy and ability to self-check. Children should apply their knowledge of rounding to estimate.

Variation and fluency

Continue to represent calculations in different ways through part whole models and bar models.



265 + 164 = 429

Concrete
Children should use place value grids and dienes/place value counters to understand exchange before moving onto expanded written method.

Subtraction

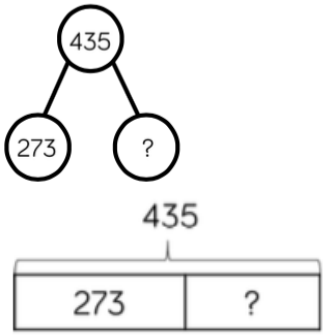
Skill: subtract numbers with up to 3 digits

Estimation
Children should be encouraged and given opportunities to estimate alongside all subtraction calculations to increase their accuracy and ability to self-check. Children should apply their knowledge of rounding to estimate.

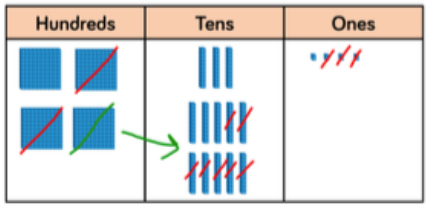
Variation and fluency

Continue to represent calculations in different ways through part whole models and bar models.

435 – 273 = 262



Concrete
Children should be given opportunities to regularly estimate their answer before working it out.



Pictorial
Children should then progress to drawing manipulates to support their understanding of exchange.

Multiplication

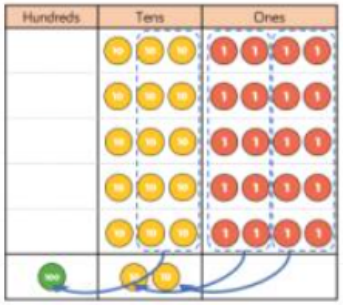
Skill: Multiply 2-digit by 1-digit

Children should use grid method first to develop their understanding of multiplying a two digit number, applying their times table knowledge to multiples of 10. Children should solve calculations involving 2, 3, 4, 5, 8 and 10 times table.

Estimation
Teachers should consistently model how we can estimate to check answers using related multiplication facts. For example, when multiplying by 4 we can double and double again. When multiplying by 5, we can use our 10 times table.

Concrete

34 × 5 = 170



Abstract
Grid method
Children use their knowledge of times tables to mentally multiply one digit by two digits. In this example, children will use 3 x 5 to solve 30 x 5. Children should also be encouraged to use x10 to help them to x5:

34 x 10 = 340
340 ÷ 2 = 170

Division

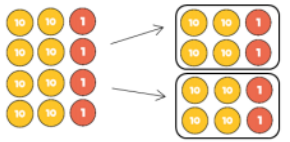
Skill: Divide two-digits by one-digit (sharing without exchange)

Children should solve division calculations involving the times tables for their year group.

Estimation
Children to use estimation to check answers. Teachers to model patterns and encourage children to make connections: dividing by 2 is the same as halving and dividing by 4 is the same as halving and halving again. Teachers should relate to halves and quarters. We can also divide by 10 to help us to divide by 5.

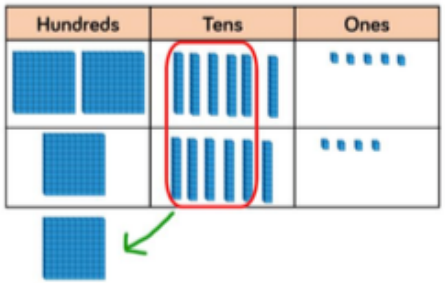
Children divide 2-digit by a 1-digit number by partitioning into tens and ones and sharing into equal groups, dividing the tens first and then the ones.

84 ÷ 2 = 42



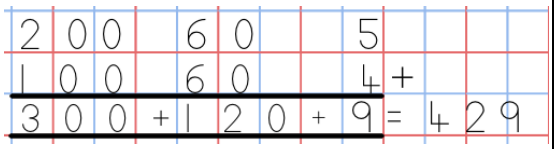
66 ÷ 3 = 22

Skill: Divide two-digits by one-digit (without remainders)
Sharing and grouping
32 ÷ 8 can be modelled as sharing among 8, the number given to each person.
Language to be used: How many groups of 8 are there in 32?

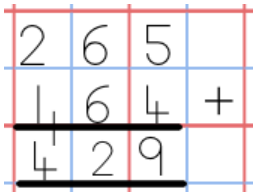


Pictorial
Children should then progress to drawing manipulates to support their understanding of addition.

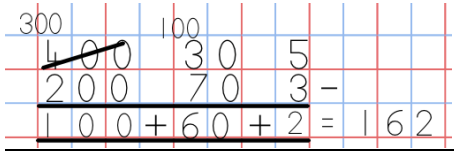
Abstract
Expanded method
Children should use expanded written method for column addition.



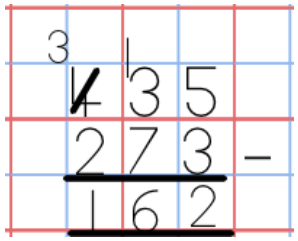
Compact method
When children have a secure understanding, then they can progress to short method. Children should always begin adding from the column with the smallest value. Children should put any carries through the line:

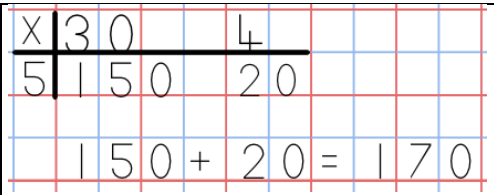


Abstract
Expanded method
Children should begin with expanded method for column subtraction, so that they understand the value of exchanges and each place value column.

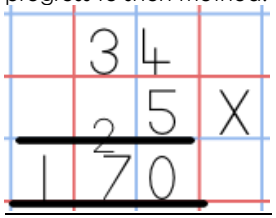


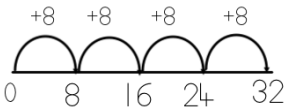
Compact method
When children have a secure understanding of exchanging, then they can progress to short method.





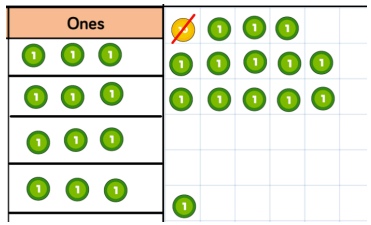
Compact method
When children are secure with partitioning and applying times table knowledge then they can go progress to short method.

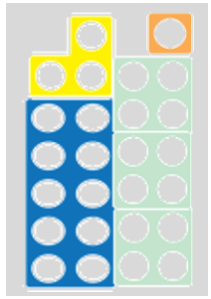


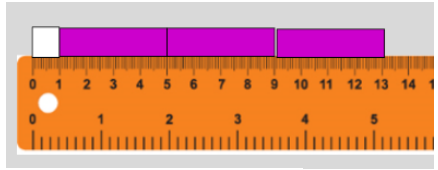


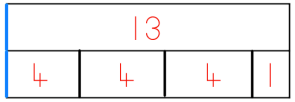
There are 4 groups of 8 in 32.
Skill: Divide two-digits by one-digit (with remainder)
Children can practise dividing with remainders using base 10, place value counters, Numicon and Cuisenaire rods.

13 ÷ 4 = 3r1



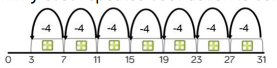
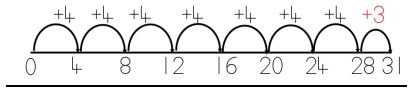






Children can work out remainders and record them using number lines through repeated subtraction **or** grouping.

Repeated subtraction:

			Tommy uses repeated subtraction to solve 31 ÷ 4  31 ÷ 4 = 7 r 3 Grouping: 

Year 4

Times tables to be taught: x7, x9, x11, x12 (revisit 2, 3, 4, 5, 6, 8 and 10)

Addition

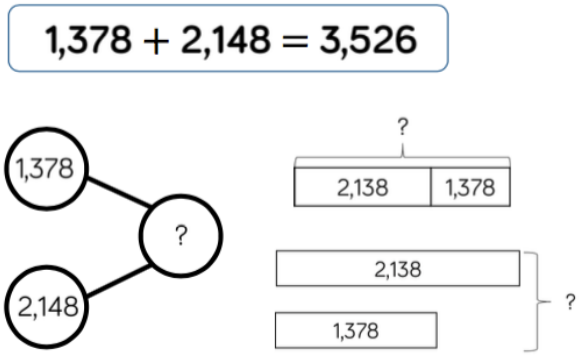
Skill: Add numbers with up to 4 digits

Base 10 and place value counters are the most effective manipulates when adding numbers with up to 4 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written method.

Estimation
Children should be encouraged and given opportunities to estimate alongside all addition calculations to increase their accuracy and ability to self-check. They should apply their knowledge of rounding to estimate.

Variation and fluency
Continue to represent calculations in different ways through part whole models and bar models.



Concrete

Children should use place value grids and dienes/place value counters to understand exchange before moving onto expanded written method.

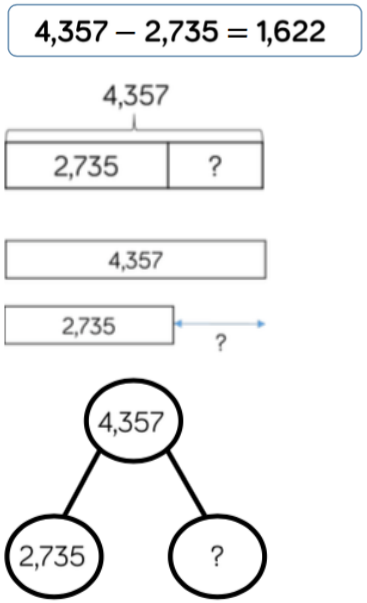
Subtraction

Skill: Subtract with up to 4 digits

Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits.

Estimation
Children should be encouraged and given opportunities to estimate alongside all subtraction calculations to increase their accuracy and ability to self-check. Children should apply their knowledge of rounding to estimate.

Variation and fluency



Concrete

Multiplication

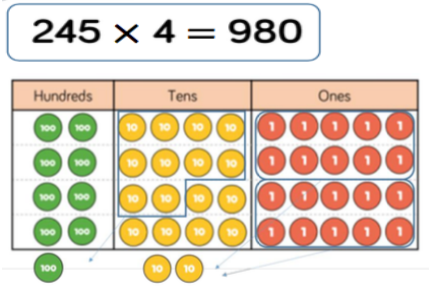
Skill: Multiply 3 digit by 1 digit

Base 10 and place value counters can continue to support the understanding of the written method.

Children should continue to practise the skill of estimating using related number facts.

Estimation
Teachers should consistently model how we can estimate to check answers using related multiplication facts. For example, when multiplying by 4 we can double and double again. When multiplying by 5, we can use our 10 times table.

Concrete



Pictorial
Children can continue to draw representations to support them with the written method.

Abstract
Grid method (multiplying a two-digit number by a one-digit number through partitioning)
Children should begin building on previous learning of expanded method to ensure that efficient and mental multiplication strategies continue to be embedded.

Division

Skill: Divide two-digits by one-digit

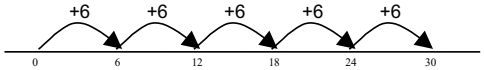
Children should solve division calculations involving all times tables.

Estimation

Children to use estimation to check answers. Teachers to model patterns and encourage children to make connections: dividing by 2 is the same as halving and dividing by 4 is the same as halving and halving again. We can divide by 10 to help us to divide by 5.

Sharing and grouping

30 ÷ 6 can be modelled as:
Grouping: groups of 6 taken away and the number of groups counted e.g.



Sharing: sharing among 6, the number given to each person

Language to be used: How many groups of 6 are in 30?

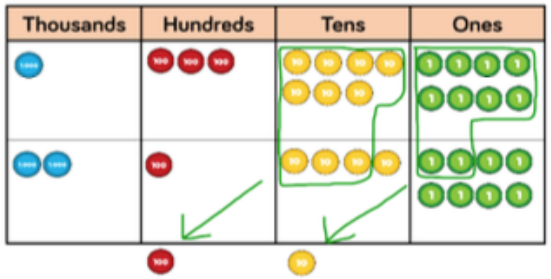
Remainders

Children build on year 3, using their times tables to partition the number into multiples of the divisor. For larger 2-digit numbers, children can use their knowledge of their 10 times table to work out how many groups.

41 ÷ 4 = 10 r1

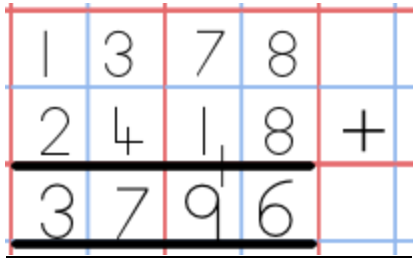
OR 41 = (10 x 4) + 1

Compact method

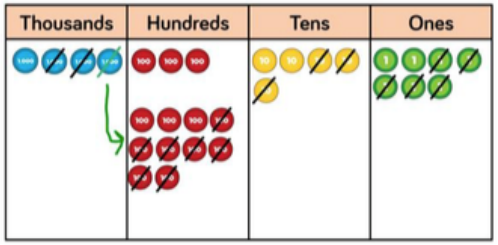


Pictorial
Children should then progress to drawing manipulates to support their understanding of addition.

Abstract
If children are secure with adding, then they can progress to compact method. If children need further support, then they should continue with expanded method until secure.

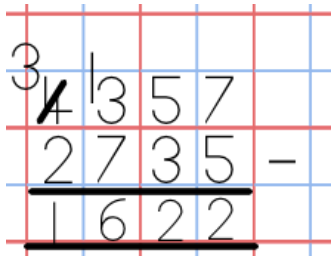


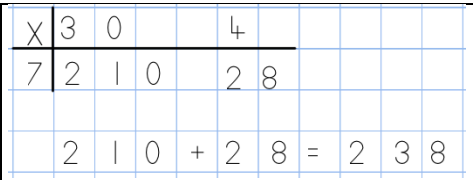
Extend to decimals in the context of money/measures with one decimal place. (vertically)
£ 2. 5 0 + £ 1. 30 = £ 3. 80



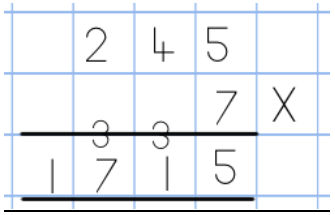
Pictorial
Children should then progress to drawing manipulates alongside their calculations to support their understanding of exchange.

Abstract
If children are secure with place value and the concept of exchange when subtracting then they can progress to compact method. If children are not secure with place value and exchange, then should continue with expanded method until secure.

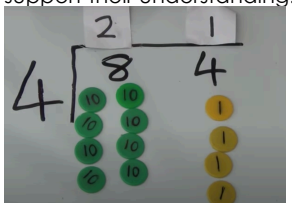




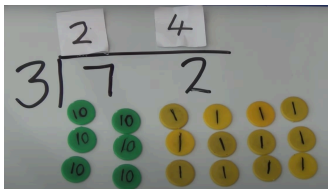
Compact method
Children can then progress to multiplying a three-digit number by a one-digit number using compact method.



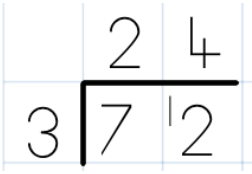
Skill: Divide three-digits by one-digit
Children should practise bus stop method dividing from a two-digit number first, without exchange using place value counters to support their understanding.



Dividing from a two-digit number with exchange:

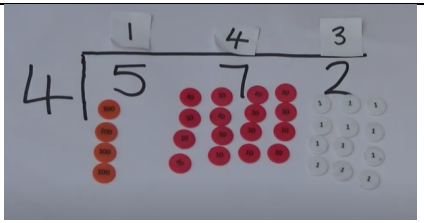
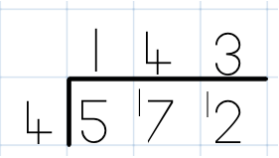


Abstract recorded as:



Divide from a 3-digit number, without exchange:

Divide from a 3-digit number, with exchange:

			 **Abstract recorded as:** 

Year 5

Times table to be taught: Revise all tables and related multiples of 10. Multiples, factors, common factors, prime, squared and cubed numbers.

Addition

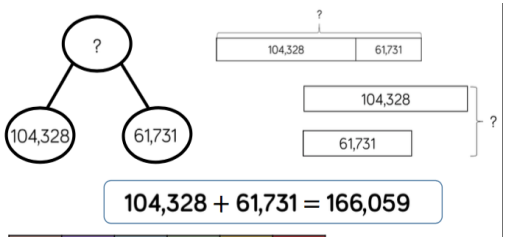
Skill: Add whole numbers with more than 4 digits

Place value counters or plain counters on a place value grid are the most effective concrete resources when adding numbers with more than 4 digits.

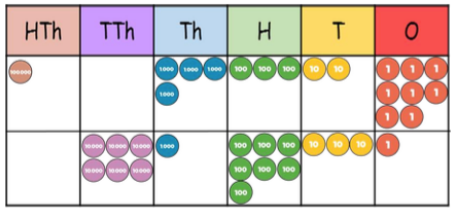
Children should now be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

Estimation
Children should be encouraged and given opportunities to estimate alongside all addition calculations to increase their accuracy and ability to self-check.

Variation and fluency
Continue to represent calculations in different ways through part whole models and bar models.



Concrete



Pictorial
Children should then progress to drawing manipulates to support their understanding of addition.

Abstract

Subtraction

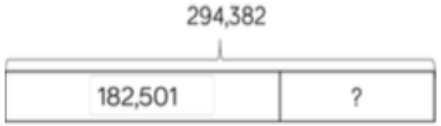
Skill: **Subtract numbers with more than 4 digits.**

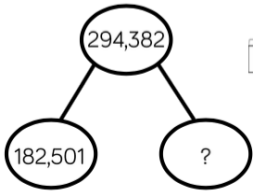
Place value counters or plain counters on a place value grid are the most effective concrete resources when subtracting numbers with more than 4 digits.

Estimation
Children should be encouraged and given opportunities to estimate alongside all subtraction calculations to increase their accuracy and ability to self-check. Children should apply their knowledge of rounding to estimate.

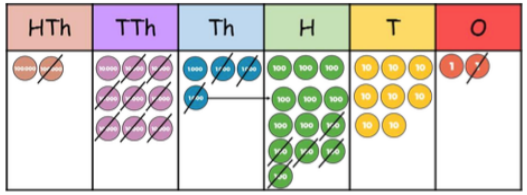
Variation and fluency

294,382 – 182,501 = 111,881





Concrete



Multiplication

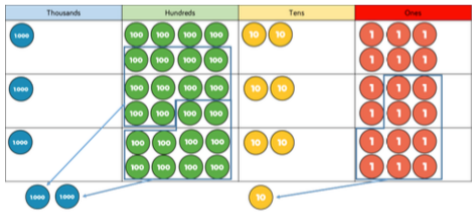
Skill: Multiply a 4 digit number by a 1 digit number

Teachers should model place value counters when introducing formal written method to support children in their understanding.
If children are struggling with times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

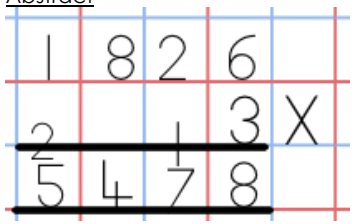
Estimation
Teachers should consistently model how we can estimate to check answers using related multiplication facts. For example, when multiplying by 4 we can double and double again. When multiplying by 5, we can use our 10 times table.

1,826 × 3 = 5,478

Concrete
Teachers can model using resources/interactive resources alongside written method when they first move onto multiplication. It may not be practical for all children to use place value counters when using larger numbers.



Abstract



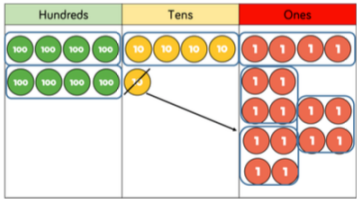
Division

Skill: Divide 3-digits by one-digit

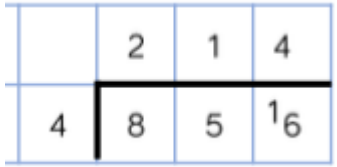
Estimation
Children to use estimation to check answers. Teachers to model patterns and encourage children to make connections: dividing by 2 is the same as halving and dividing by 4 is the same as halving and halving again. We can divide by 10 to help us to divide by 5.

Sharing and grouping

Continue to understand division as both sharing and grouping (repeated subtraction).

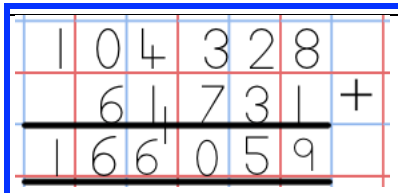


Abstract recorded as:



Skill: Divide 4-digits by 1-digit (without remainders)

Teachers can model alongside written method when they first move onto division. It may not be practical for all children to use place value counters when using larger numbers.

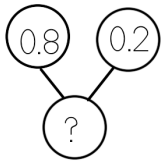


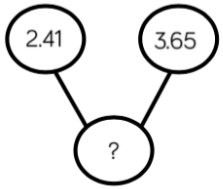
Skill: Add with up to 3 decimal places

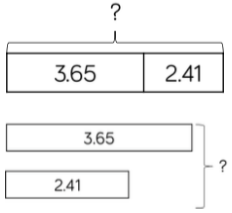
Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2 and 3 decimal places.

Variation and fluency

Children should practise adding decimals mentally, using their place value knowledge before using a written method. Children should apply their number bonds to decimals and extend their understanding of how to make 1 whole.







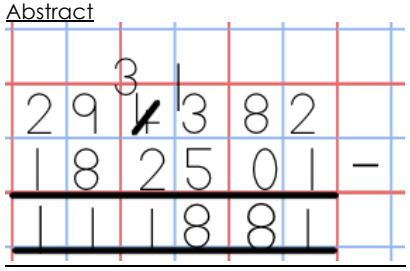
3.65 + 2.41 = 6.06

Concrete

Pictorial

Children should then progress to drawing manipulates to support their understanding of addition.

Abstract

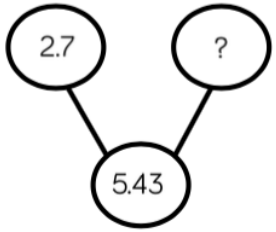


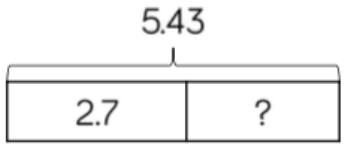
Skill: Subtract with up to 3 decimal places

Ensure children have experience of subtracting decimals with different decimal places. This includes putting this into context when subtracting money and other measures.

Variation and fluency

5.43 − 2.7 = 2.73





Concrete

Children can use plain counters or place value counters and a place value grid to support their understanding of subtracting decimals and exchanging across the decimal place.

Skill: Multiply 2-digit numbers by 2-digt numbers

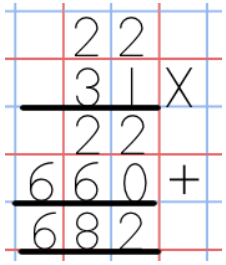
The grid method can be shown to children first as an initial written method before moving on to the formal written long multiplication method.

22 × 31 = 682

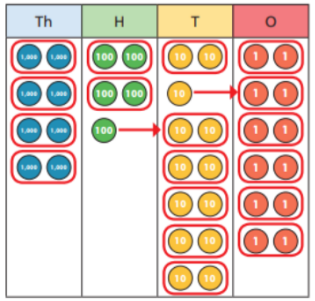
Teachers to model grid method pictorially and in abstract alongside each other so that children are able to make connections.

×	20	2
30	600	60
1	20	2

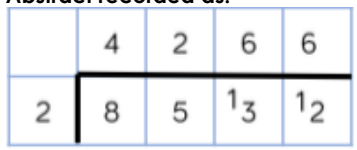
Children should practise the method without carries first.



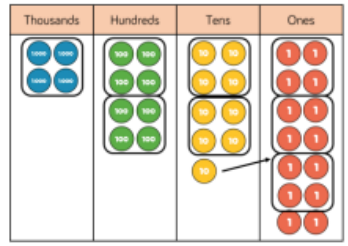
Skill: Multiply 3-digit numbers by 2-digit numbers



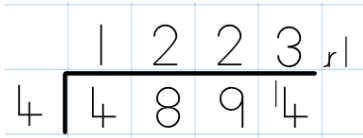
Abstract recorded as:

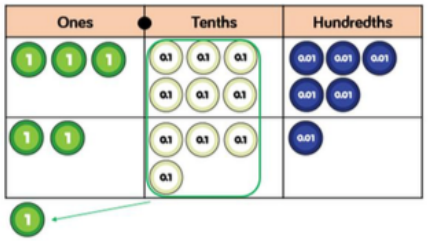


Skill: Divide 4-digits by 1-digit (with remainders)



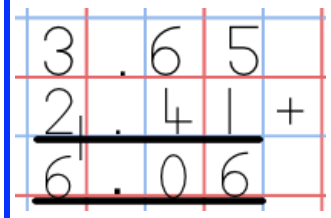
Abstract recorded as:

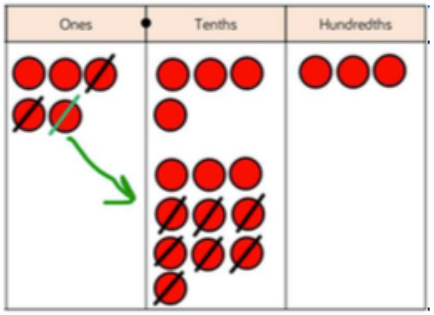




Pictorial
Children can draw place value counters to extend their understanding of decimal places and addition.

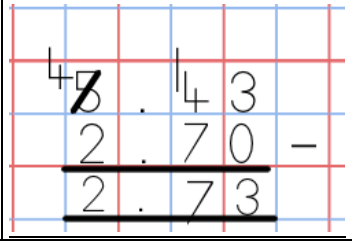
Abstract

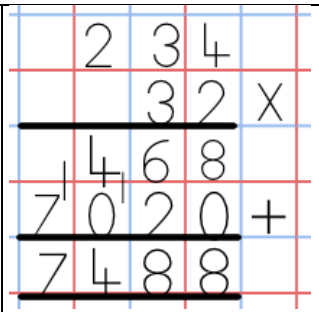




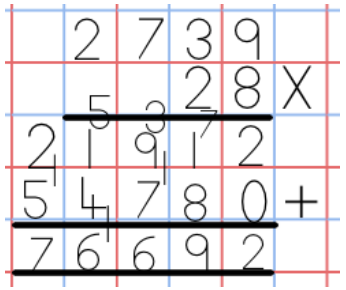
Pictorial
Children can draw place value counters and representations to extend their understanding of decimal places and subtraction.

Abstract





Skill: Multiply 4 digit numbers by 2 digit numbers
Children should be confident in the written method and able to apply it to larger numbers. Children can continue to use multiplication grids if they are struggling with times tables.



Year 6

Times table to be taught: revisit all, including counting in decimals

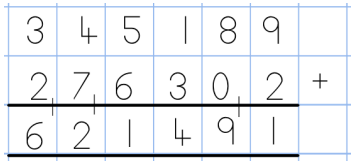
Addition

Skill: Add integers with more than 4 digits

Children consolidate their knowledge of column addition. Children should progress to multi-digit calculations.

Estimation
Children should be encouraged and given opportunities to estimate alongside all addition calculations to increase their accuracy and ability to self-check.

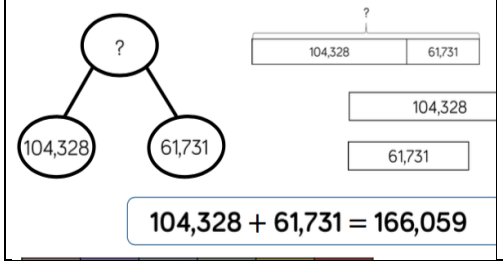
Abstract recorded as:



Children should consider the most efficient method.
When adding 999 it is easier to add 1000 then subtract 1.
They use these skills to solve multi-step problems in a range of contexts.

Example:
A four bedroom house costs £450,000
A three bedroom house costs £201,000 less.
How much does the three bedroom house cost?
What method did you use to find the answer?

Continue to represent calculations in a variety of ways through part whole models and bar models.



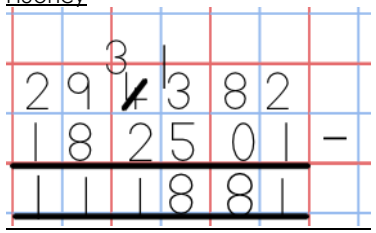
Subtraction

Skill: Subtract integers with more than 4 digits

Children consolidate their knowledge of column subtraction, reinforcing the language of exchange.

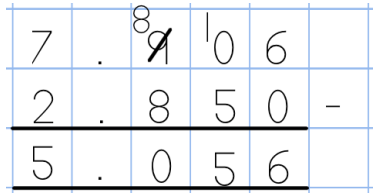
Estimation
Children should be encouraged and given opportunities to estimate alongside all subtraction calculations to increase their accuracy and ability to self-check. Children should apply their knowledge of rounding to estimate.

Fluency



Skill: Subtract decimals with up to 3 decimal places
Calculations should involve subtracting with different decimal places.

Abstract can be recorded as:



Find a difference by counting up

e.g. 0.5 – 0.31 = 0.19
This can be modelled on an empty number line
A number square may be used.

Multiplication

Skill : Multiply decimals by integers (short multiplication)

Children use concrete resources to multiply decimals and explore what happens when you exchange with decimals. Children use their skills in context and make links to money and measures.

Estimation
Teachers should consistently model how we can estimate to check answers using related multiplication facts for both integers and decimals. For example, when multiplying by 4 we can double and double again. When multiplying by 5, we can use our 10 times table.

1.212 x 3

A jar of sweets weighs 1.213 kg.
How much would 4 jars weigh?

Rosie is saving her pocket money. Her mum says,

"Whatever you save, I will give you five times the amount."

If Rosie saves £2.23, how much will her mum give her?
If Rosie saves £7.76, how much will her mum give her? How much will she have altogether?

Abstract can be recorded as:

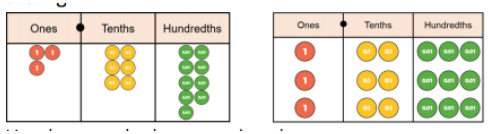
Division

Skill: Divide decimals by integers

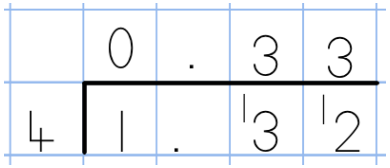
Estimation
Children to use estimation to check answers. Teachers to model patterns between integers and decimals and encourage children to make connections: dividing by 2 is the same as halving and dividing by 4 is the same as halving and halving again. We can divide by 10 to help us to divide by 5.

Children build on their knowledge of sharing and grouping when dividing and apply this skill in context.

3.69 ÷ 3



Abstract can be recorded as:



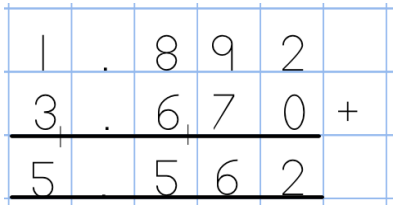
Children will apply their understanding of division to solve problems where the answer has up to 2 decimal places.

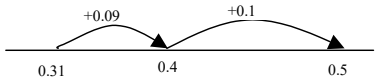
Modelling clay is sold in two different shops.
Shop A sells four pots of clay for £7.68
Shop B sells three pots of clay for £5.79
Which shop has the better deal?
Explain your answer.

Skill: Divide multi digits by two-digits (short division)
Children should be encouraged to write out multiples to support their calculations with larger remainders.

Skill: Add decimals with up to 3 decimal places
Calculations should involve adding decimals with different decimal places.

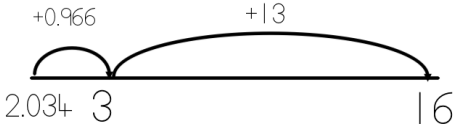
Abstract recorded as:

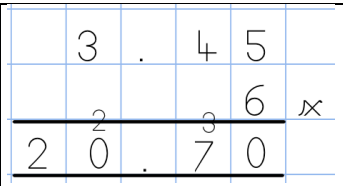




When subtracting decimals with different decimal places, teachers should model rounding to the nearest whole number to find the difference. Children should apply their number bonds to decimals, extending their understanding of making 1 whole.

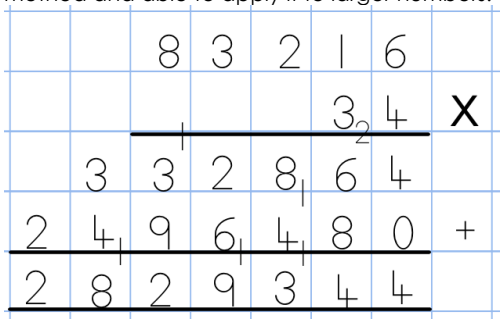
16 – 2.034

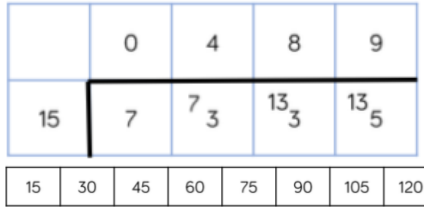




Skill: Multiply multi digit numbers by 2 digit numbers (long multiplication)

Children should be confident in the written method and able to apply it to larger numbers.





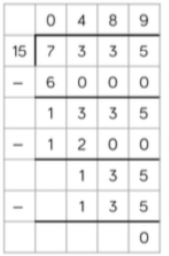
15	30	45	60	75	90	105	120	135	150

Skill: Divide multi-digits by two-digits (long division)
Children can also divide by two-digit numbers using long division.

Three-digit divided by a two-digit number:

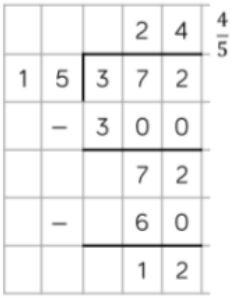
12 × 1 = 12
12 × 2 = 24
12 × 3 = 36
12 × 4 = 48
12 × 5 = 60
12 × 6 = 72
12 × 7 = 84
12 × 8 = 96
12 × 7 = 108
12 × 10 = 120

Four-digit divided by a two-digit number:



1 × 15 = 15
2 × 15 = 30
3 × 15 = 45
4 × 15 = 60
5 × 15 = 75
10 × 15 = 150

Skill: Divide by two-digits (with remainders)
When there is a remainder left at the end of the calculation, children should convert it to a fraction by putting the remainder over the number that they are dividing by and simplifying where possible.

			 1 × 15 = 15 2 × 15 = 30 3 × 15 = 45 4 × 15 = 60 5 × 15 = 75 10 × 15 = 150 12/15 simplifies to 4/5 or 0.8 as a decimal. 

<u>References</u>

NCETM, White Rose Maths and School Improvement Liverpool documents have been used to support this calculation policy.