Year 3 Addition and subtraction

Add and subtract numbers mentally, including a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds.

Using their knowledge of concrete and pictorial representation of a 3 digit number, the children can add a hundred to make 357; add a ten to make 267 or add a one to make 258.

This would be the same for subtracting a hundred, ten or one.

Add numbers with up to three digits using the formal method of columnar addition.

Using their understanding of place value, children use squares in their books to put two 3-digit numbers into columns. Initially the children may partition the number.

	2	0	0	+	5	0	+	7
+	1	0	0	+	3	0	+	2
	3	0	0	+	8	0	+	9

	2	5	7
+	1	3	2
	3	8	9

Then children will begin to use this knowledge to add the ones, then the tens and then the hundreds.

<u>Look what happens when the numbers 'bridge' over to the next column.</u>

287+132

	2	0	0	+	8	0	+	7
+	1	0	0	+	3	0	+	2
	1	0	0					
	4	0	0	+	1	1	0	+	9

	2	8	7
+	1	3	2
	1		
	4	1	9

Subtract numbers with up to three digits using the formal method of columnar subtraction.

357 − 134

	3	0	0	+	5	0	+	7
−	1	0	0	+	3	0	+	4
	2	0	0		2	0		3

Similarly to addition, when subtracting, children must put their two 3-digit numbers into columns keeping the H, T and Ones in correct columns. They may find it easier to partition the numbers and then subtract.

Children will then subtract the ones, then the tens and then the hundreds.

	3	5	7
−	1	3	4
	2	2	3

For both addition and subtraction, practising the Year 2 quick mental skills are vital eg knowing 7-4 = 3 because 3+4 =7 and 50+30 =80. Knowledge of patterns in number eg. An odd number add an odd number equals an even number.

What happens when children need to subtract more tens or ones than they have?

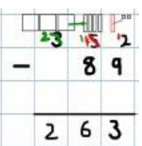
Rosie thinks 352 – 89 = 337

	H	T	O
	3	5	2
–		8	9
	3	3	7

This is a common mistake.

Children should use Base 10 to exchange a ten for 10 ones and exchange a hundred for 10 tens.

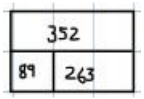
	3	5	2
−		8	9

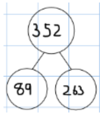


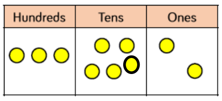
All the time, children use their knowledge of inverse to check their answers. Bar Models and part whole models help make sense of this.

89 +263 = 352

352 – 263 = 89

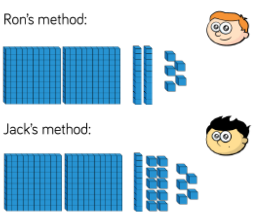






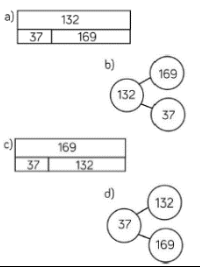
Examples of problems Year 3 children would need to solve.

Ron and Jack use Base 10 to solve 225 – 8



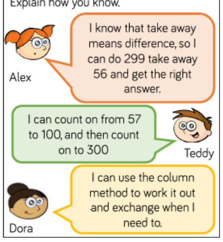
Explain which method you would use and why.

Eva has 169 sweets in a jar.
She gives 37 sweets to Mo.
Which model represents this problem?



Alex, Teddy and Dora are trying to work out 300 – 57

Who has the most efficient way of working it out?
Explain how you know.



Work out the missing digits.

	H	T	O
	5	?	3
–	2	1	8
	3	1	5

	H	T	O
	?	0	?
–	2	?	8
	2	4	6

Eva is working out 406 – 289

Here is her working out:

Step 1

$$\begin{array}{r} \overset{3}{\cancel{4}}\,0\,{}^{1}6 \\ -\,2\,8\,9 \\ \hline 7 \end{array}$$

Step 2

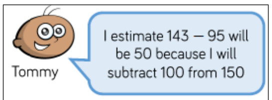
$$\begin{array}{r} {}^{2}\overset{\cancel{3}}{\cancel{4}}\,{}^{1}0\,{}^{1}6 \\ -\,2\,8\,9 \\ \hline 0\,2\,7 \end{array}$$

Explain her mistake.

Choose one 2-digit and one 3-digit number.
Write additions that have an exchange in the ones and the tens columns.

23 35 81 56

756 467 487 619



Is this a good estimate? Why?

Year 4 Addition and subtraction

Children continue to secure formal method for column addition for numbers with up to 4 digits.

	Th	H	T	O
	3	4	2	1
+	2	3	1	4
	5	7	3	5

Th	H	T	O
3	4	2	1
2	6	9	3
1	1		
6	1	1	4

Children in Year 4 should be able to recall these number facts quickly and accurately and without the use of their fingers!

Eg 6+4=10 2+9=11 3+2+1=6

Children continue to secure formal method for column subtraction for numbers with up to 4 digits.

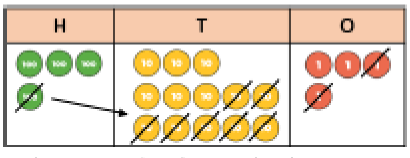
Many children will continue to use manipulatives to help explain exchanging, where necessary.

	Th	H	T	O
	7	4	6	5
−	3	2	4	4
	4	2	2	1

	Th	H	T	O
	7	³~~4~~	¹6	5
−	2	2	7	4
	5	1	9	1

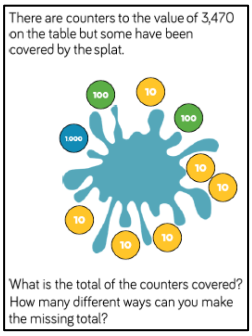
Children must set their work out accurately to help their calculations. It is important that they read the calculations correctly eg in the tens column it is **6 tens takeaway 7 tens, which is not possible so they will need to exchange a hundred for 10 tens.**

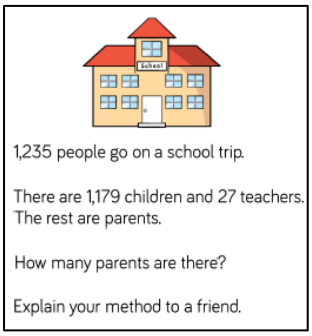
Rather than 7-6= 1 which is not correct.

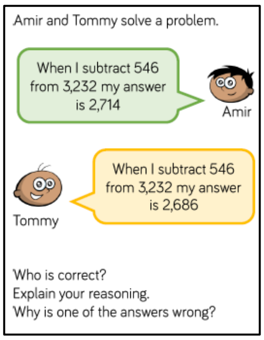


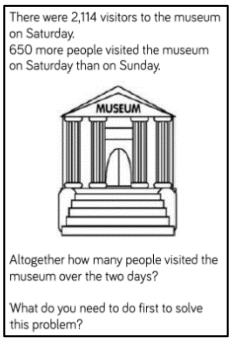
	³~~4~~	¹3	4
−		7	2
	3	6	2

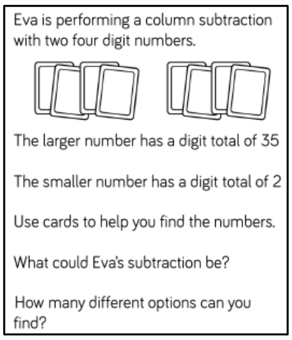
These are examples of problems children may need to solve. Children are encouraged to use the column method and share working.











Ron, Rosie and Dexter are calculating 7,000 − 3,582

Here are their methods:

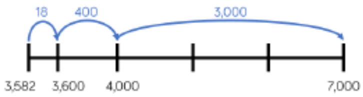
Ron

	Th	H	T	O
	⁶~~7~~	⁹~~0~~	⁹~~0~~	¹0
−	3	5	8	2
	3	4	1	8

Rosie

	Th	H	T	O
	6	9	9	9
−	3	5	8	1
	3	4	1	8

Dexter



3,000 + 400 + 18 = 3,418

Whose method is most efficient?

Use the different methods to calculate 4,000 – 2,831

Rosie's method is not really taught, but language about the difference between 2 numbers is used for subtraction so adjustment of 2 numbers could be investigated for some children.

Dexter uses a counting on method, again to solve the difference.

Ron's method is the column method but not an easy calculation because of the number of exchanging of digits.

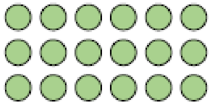
Year 3 Multiplication and division

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables

Children must count on and back in 3, 4 and 8s (recapping 2, 3, 5 and 10 regularly) to recognise multiples of these, noticing patterns eg even numbers only as multiples of 4 and 8; odd and even answers for 3.

Children recap their understanding of recognising, making and adding equal groups. This will allow them to build on prior learning and prepare them for the next steps.

	Add It 4+4+4+4+4+4+4+4
Say it There are ___ equal groups with ___ in each group. There are ___ altogether.	Multiply it 8 X 4 = 32



___ ÷ 3 = ___

Jack has 18 seeds.

He plants 3 seeds in each pot.

18					
3	3	3	3	3	3

Building on their knowledge of the 2 x table, children multiply by 4. Links to doubling and doubling again when multiplying by 4; links to repeated addition and counting in 4s.

When multiplying, they can use pictorial representations eg triangles. I triangle has 3 sides, 4 triangles will have 12 sides in total – 4 triangles with 3 sides on each, 4 x 3 = 12

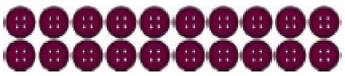
When multiplying by 8 they can notice legs on spiders; 1 spider has 8 legs, 5 spiders have 40 legs altogether. 5 spiders with 8 legs on each so 5 X 8 = 40

8+8+8+8+8 = 40 or using commutativity knowledge so 5+5+5+5+5+5+5+5=40.

How many legs altogether do four spiders have?
There are ___ legs on each spider.
___ + ___ + ___ + ___ = ___
___ x 8 = ___
If there are ___ spiders, there will be ___ legs altogether.

When dividing by 3, 4 or 8 the children use concrete and pictorial representations and their knowledge of the inverse to check answers. They share into 4 equal groups or grap groups of 4.

Circle the buttons in groups of 4.



Can you also split the buttons into 4 equal groups?
How is this the same? How is it different?

Vocabulary: How many equal groups are there? How many in each group? How many altogether?

Write and calculate mathematical statements for multiplication and division using the multiplication tables that he/she knows, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

Children begin to calculate Multiplication sentences outside the 12x… eg 15 x 3
Knowing that 10x3=30 + 5x3=15 so 15x3 = 45

x	10	5	
3	30	15	45

Children may begin to recognise 9x4 =36 because they know that 10x4 =40; 6x3= 18 because they know 3x3=9; 13 x 2 is double 13 so 26.

Problem solving and applying:

There are 32 children in a PE lesson.
They are split into 8 equal teams for a relay race.
How many children are in each team?
Use counters or multi-link to represent each child

There are ___ teams with ___ children in each team.

Tommy has four bags with five sweets in each bag.

Annie has six bags with four sweets in each bag.

Who has more sweets?

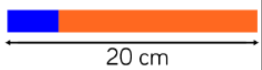
How many more sweets do they have?

Draw a picture to show this problem.

Here is a blue strip of paper.

An orange strip is four times as long.

The strips are joined end to end.



How long is the blue strip?

How long is the orange strip?

Explain how you know.

Rosie has some packs of cola which are in a box.

Some packs have 4 cans in them, and some packs have 8 cans in them.

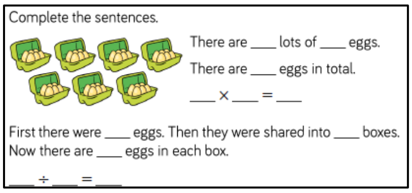
Rosie's box contains 64 cans of pop.

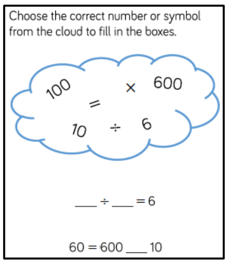
How many packs of 4 cans and how many packs of 8 cans could there be?

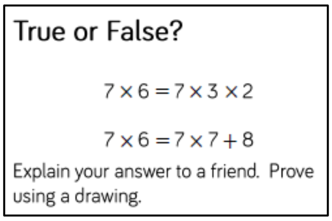
Find all the possibilities.

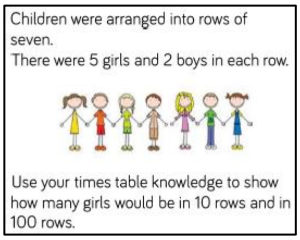
Year 4 Multiplication and division

*Children regularly count on in **6, 7, 8, 9, 11 and 12**; multiply by **6, 7, 8, 9, 11 and 12** and divide by **6, 7, 8, 9, 11 and 12** in the same way as Year 3 do 4, 6 and 8. They use concrete and pictorial representations as well as writing multiplication sentences and matching division sentences.*









Children multiply 3 numbers together

Children are introduced to the 'Associative Law' to multiply 3 numbers. This law focuses on the idea that it doesn't matter how we group the numbers when we multiply

e.g. $4 \times 5 \times 2 = (4 \times 5) \times 2 = 20 \times 2 = 40$

or $4 \times 5 \times 2 = 4 \times (5 \times 2) = 4 \times 10 = 40$

They link this idea to commutativity and see that we can change the order of the numbers to group them more efficiently, e.g. $4 \times 2 \times 5 = (4 \times 2) \times 5 = 8 \times 5 = 40$

Factor Pairs

Children learn that a factor is a whole number that multiplies by another number to make a product

e.g. $3 \times 5 = 15$, factor × factor = product.

They develop their understanding of factor pairs using concrete resources to work systematically, e.g. factor pairs for 12 –begin with $1 \times 12, 2 \times 6, 3 \times 4$. *At this stage, children recognise that they have already used 4 in the previous calculation therefore all factor pairs have been identified.*

Efficient Multiplication

Children develop their mental multiplication by exploring different ways to calculate.

They partition two-digit numbers into tens and ones or into factor pairs in order to multiply one and two-digit numbers.

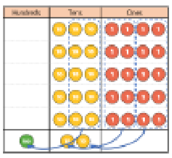
By sharing mental methods, children can learn to be more flexible and efficient.

*25 x 8 = 20x8+5x8 **or** 5x5x8 **or** 25x10-25x2 **or** 50x8÷ 2*

Formal Multiplication Methods

Children build on their understanding of formal multiplication from Year 3 to move to the formal short multiplication method.

Children use their knowledge of exchanging ten ones for one ten in addition and apply this to multiplication, including exchanging multiple groups of tens. They use place value counters to support their understanding.



	H	T	O		
		3	4		
x			5		
		2	0	(5 x 4)	
+	1	5	0	(5 x 30)	
	1	7	0		

Formal Division Methods

Children build on their knowledge of dividing a 2-digit number by a 1-digit number from Year 3 by sharing into equal groups.

Children use examples where the tens and the ones are divisible by the divisor, e.g. 96 divided by 3 and 84 divided by 4. They then move on to calculations where they exchange between tens and ones