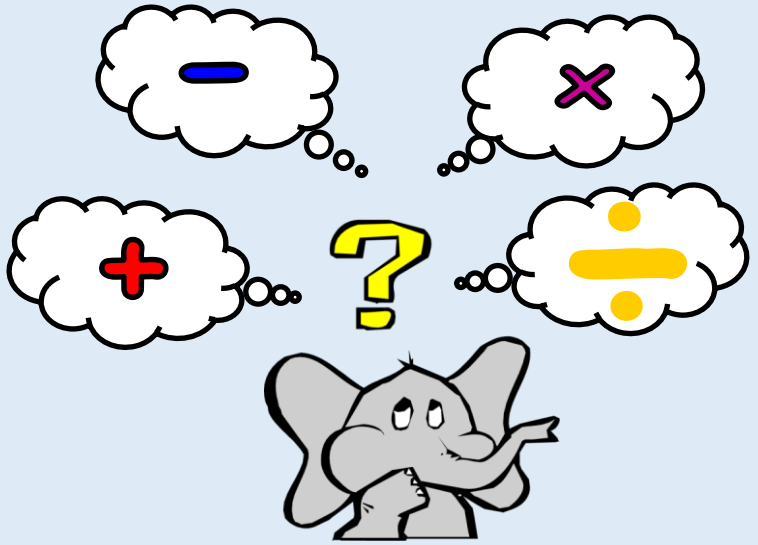
Mathematics Calculation Policy



Amended in consultation with Staff November 2019

About PiXL's Calculation Policy

- The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.
- Age stage expectations:

  The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils. However, it is vital that pupils are taught according to the pathway that they are currently working at and are showing to have 'mastered' a pathway before moving on to the next one. Of course, pupils who are showing to be secure in a skill can be challenged to the next pathway as necessary.
- Choosing a calculation method:

  Before pupils opt for a written method they should first consider these steps:

Can I do it in my head using a mental strategy? → Could I use some jottings to help me? → Should I use a formal written method to work it out?

NCETM
Calculation Guidance Principles

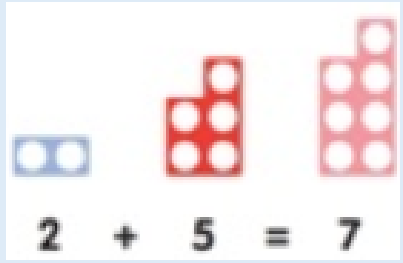
- *Develop children's fluency with basic number facts*
- *Develop children's fluency in mental calculation*
- *Develop children's understanding of the = symbol*
- *Teach inequality alongside teaching equality*
- *Use empty box problems*
- *Use intelligent practice*
- *Expose mathematical structure and work systematically*
- *Move between the concrete and the abstract*
- *Contextualise the mathematics*

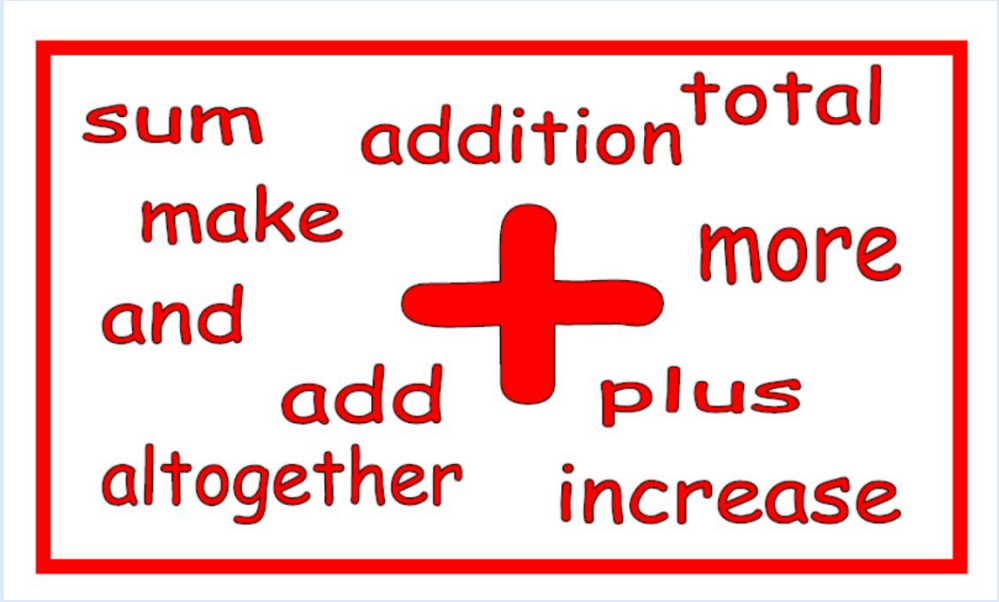
Addition

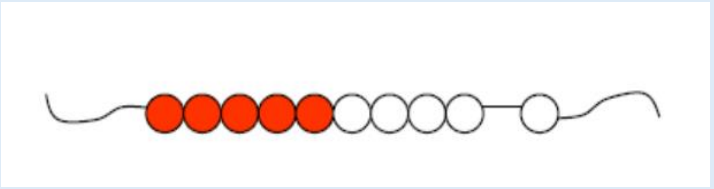
Concrete resources:

100 square
Number lines
Bead strings
Straws
Dienes
Place value cards
Place value dice
Place value counters
Numicon

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



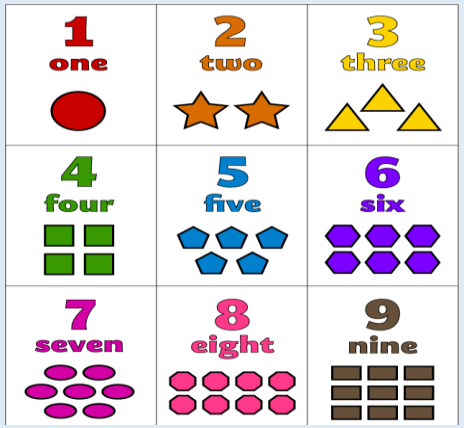




Addition: Reception

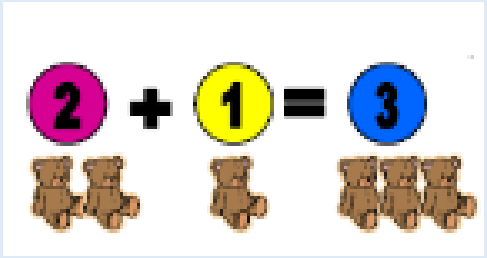
Early learning goals:
✓Count reliably with numbers from 1 to 20, place them in order.
✓Say which number is one more than a given number.
✓Using quantities and objects, they add two single-digit numbers and count on to find the answer.

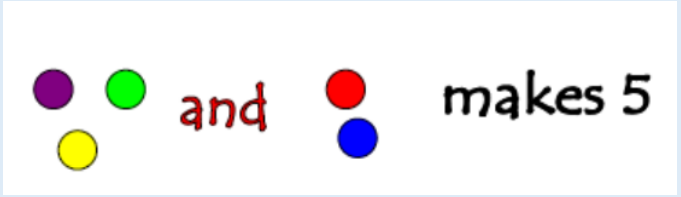
Recognise numbers up to 20 and understand the meaning of each number by recognising and knowing their clusters



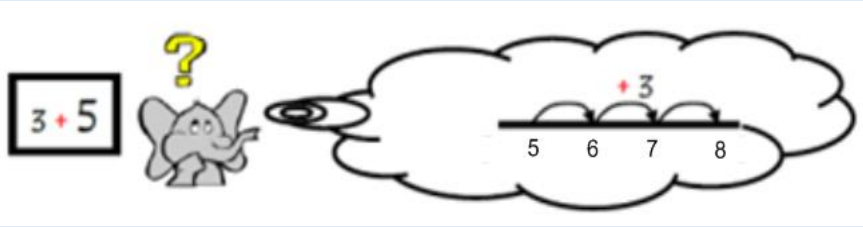
Count on in ones and say which number is one more than a given number using a number line or number track to 20.

Begin to relate addition to combining two groups of objects using practical resources, role play, stories and songs.





Know that counting on is a strategy for addition. Use numbered number lines to 20.



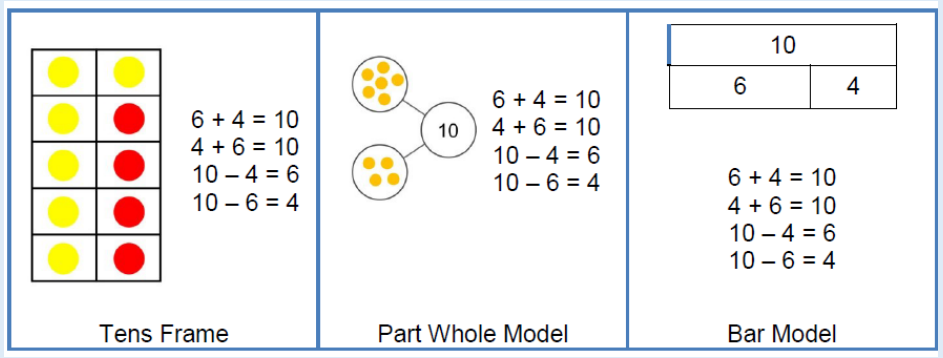
Addition: Year 1

Year 1 statutory requirements :

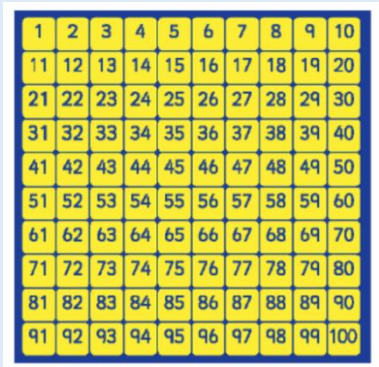
- ✓ Count to and across 100, forwards beginning with 0 or 1, or from any given number.
- ✓ Given a number, identify one more.
- ✓ Read, write and interpret mathematical statements involving addition (+), and equals (=) signs.
- ✓ Represent and use number bonds and related subtraction facts within 20
- ✓ Add one-digit and two-digit numbers to 20, including zero.
- ✓ Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems.

Identify and represent numbers using objects and pictorial representations (multiple representations)

Memorise and reason with number bonds to 10 and 20 in several forms.

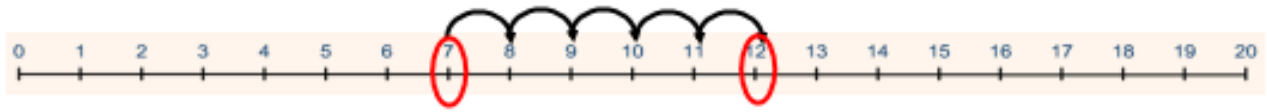


Count on in ones to and across 100 and find one more than a given number.



Addition: Year 1

Use concrete resources and a number line to support the addition of numbers. Know and use strategy of finding the larger number, and counting on in ones from this number.

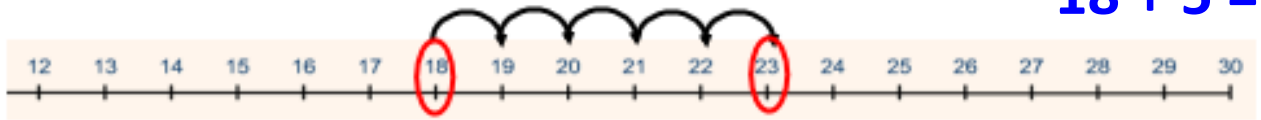


1 digit + 1 digit

7 + 5 = 12

Begin to use the + and = signs to write calculations in a number sentence.

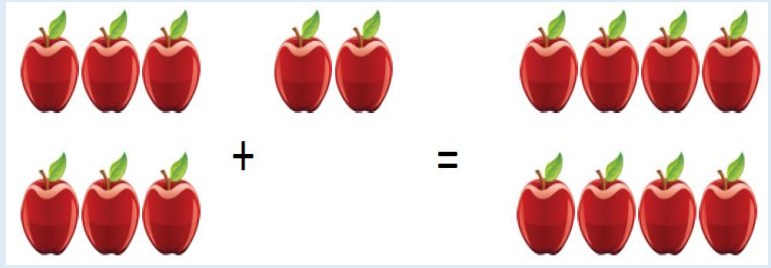
18 + 5 = 23



2 digit + 1 digit

Solve one-step problems using concrete objects and pictorial representations.

Tom picks 6 apples and Raj picks 2 apples. How many apples do they have altogether?



- Missing number problems
- Numicon used to support learning.

Addition: Year 2

Year 2 statutory requirements :

✓ Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100.

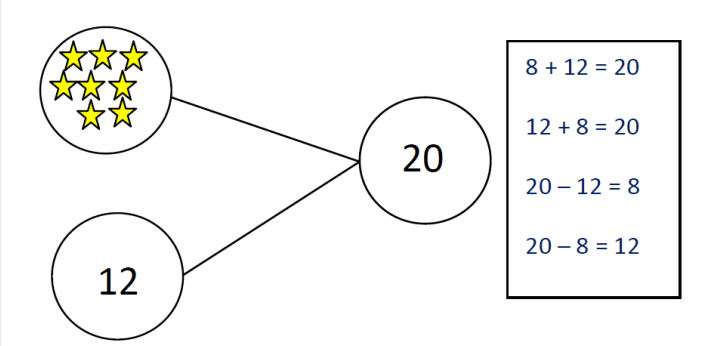
✓Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

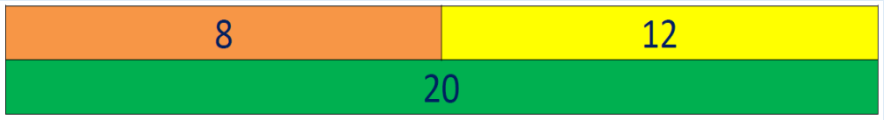
✓ Add numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers.

✓ Solve problems with addition including those involving numbers, quantities and measures.

Memorise and reason with number facts to 20 in several forms.

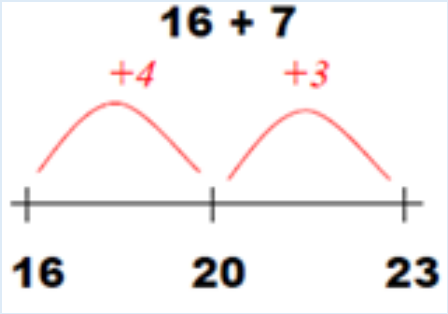




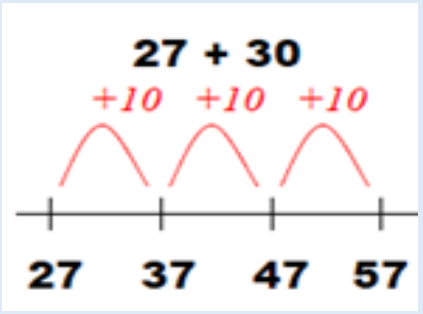
Partition two 2-digit numbers using a variety of models and images.

Addition: Year 2

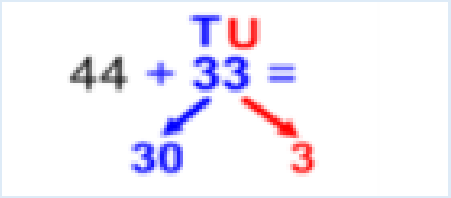
Add 2 digit number and ones

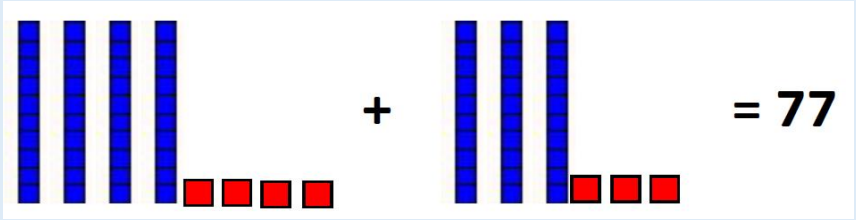


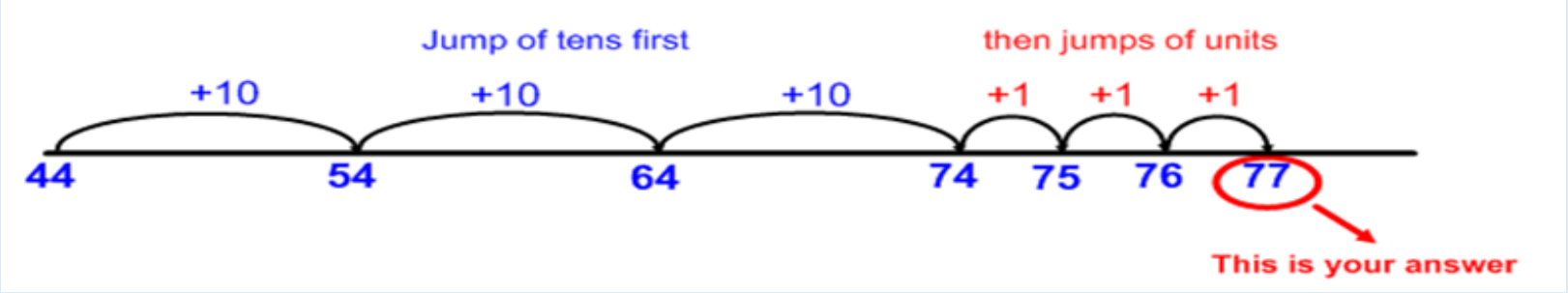
Add 2 digit number and tens



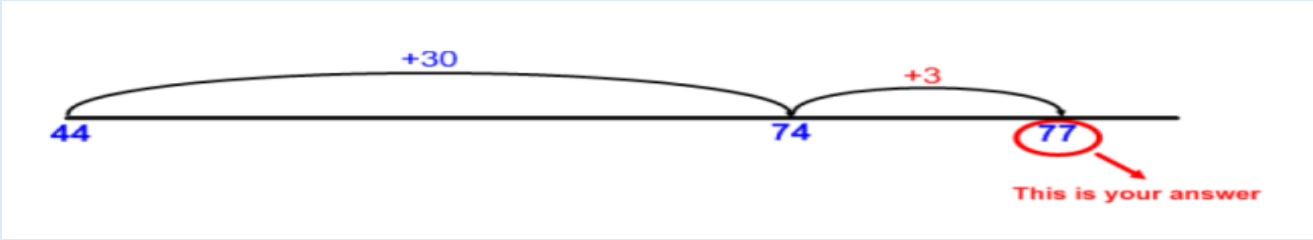
Use partitioning to add two 2-digit numbers using concrete resources and/or a numbered number line and then progressing to an empty number line.







As children gain confidence with adding on tens and ones, they should be taught to combine the jumps on an empty number line.



Addition: Year 3

Year 3 statutory requirements :

- Find 10 or 100 more than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Add numbers with up to three digits, using formal written methods of columnar addition.

Use expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits ***with no carrying***.

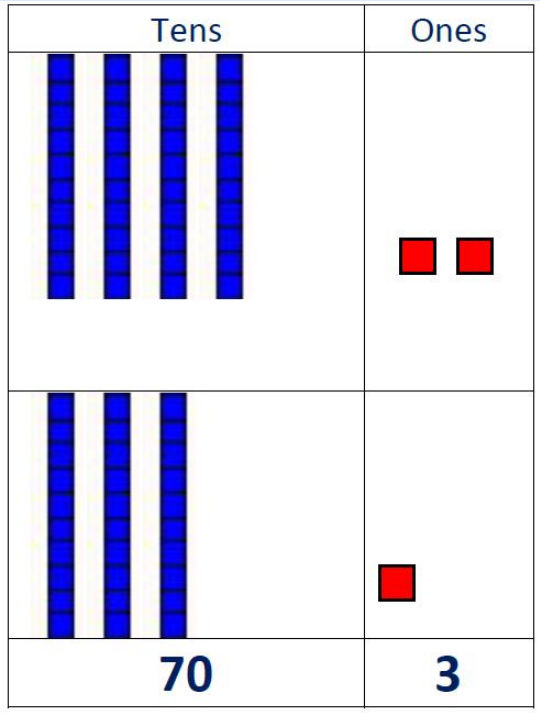
42 + 31 = 73

40 + 2

30 + 1

70 + 3

OR



Addition: Year 3

Progress to using the expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits ***with carrying***.

47 + 36 = 83

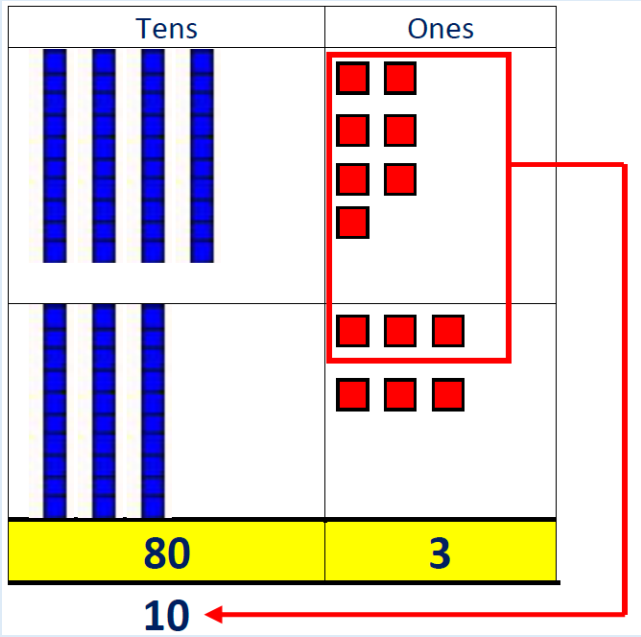
40 + 7

30 + 6

80 + 3

10

OR



Extend to using the expanded column method to add three digit numbers + three digit numbers ***with carrying***.

367 + 185 = 552

300 + 60 + 7

100 + 80 + 5

500 + 50 + 2

100 10

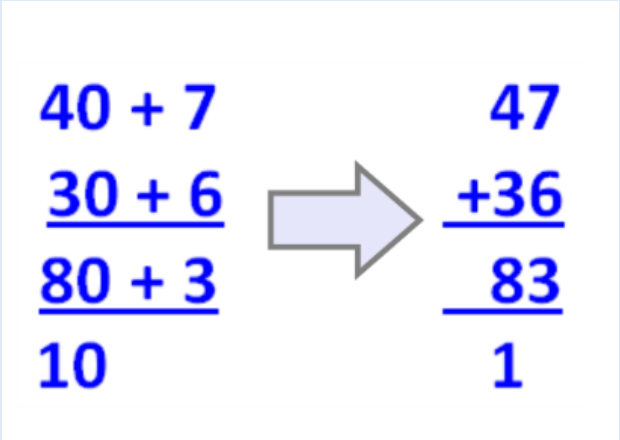
Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

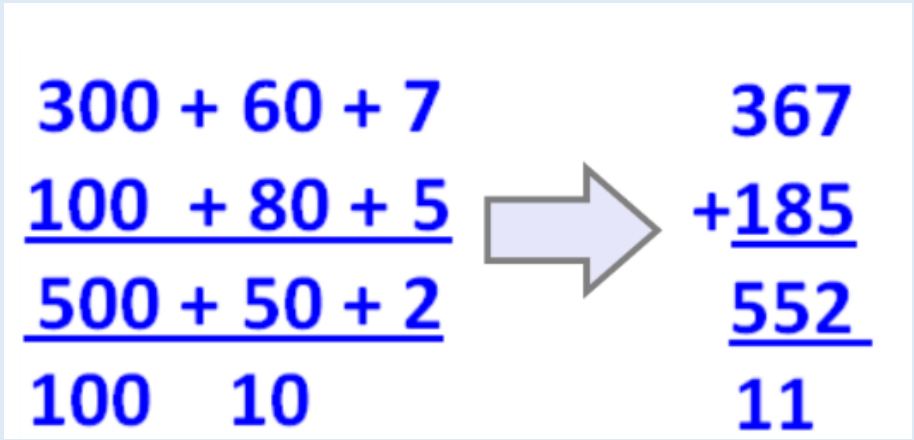
Addition: Year 4

Year 4 statutory requirements :

- Find 1000 more than a given number.
- Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.
- Solve addition two-step problems in contexts, deciding which operations and methods to use and why,

Build on learning from Year 3 and model how expanded method links to compact column addition method.





Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

By the end of year 4, pupils should be adding numbers up to 4 digits using compact column addition method.