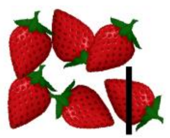
Subtraction at Ravensbury

Year 1

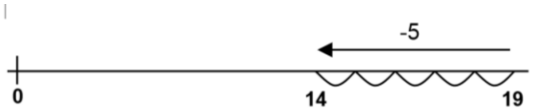
Missing number problems e.g. 7 = □ - 9; 20 - □ = 9; 15 – 9 = □; □ - □ = 11; 16 – 0 = □

Use concrete objects and pictorial representations. If appropriate, progress from using number lines with every number shown to number lines with significant numbers shown.

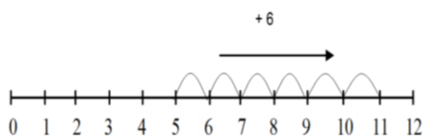
Understand subtraction as take-away:

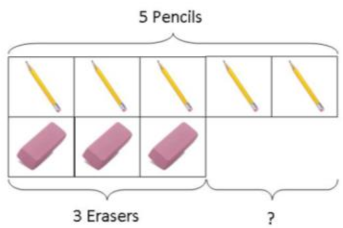


6 – 1 = 5



Understand subtraction as finding the difference:

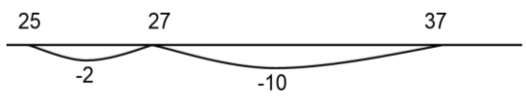


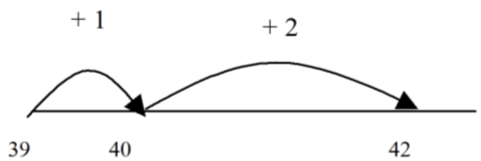


Year 2

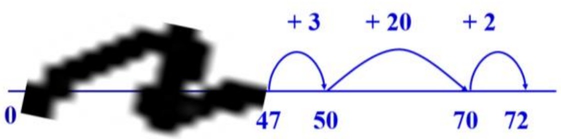
Missing number problems e.g. 52 – 8 = □; □ – 20 = 25; 22 = □ – 21; 6 + □ + 3 = 11

It is valuable to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference.





The link between the two may be supported by an image like this, with 47 being taken away from 72, leaving the difference, which is 25.



The bar model should continue to be used, as well as images in the context of **measures**.

<u>Towards written methods</u>

Recording addition and subtraction in expanded columns can support understanding of the quantity aspect of place value and prepare for efficient written methods with larger numbers. The numbers may be represented with Dienes apparatus. E.g. 75 – 42

Year 3

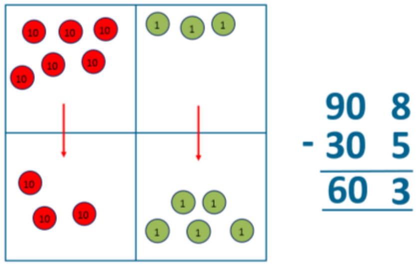
Missing number problems e.g. □ = 43 – 27; 145 – □ = 138; 274 – 30 = □; 245 – □ = 195; 532 – 200 = □; 364 – 153 = □

<u>Mental methods</u> should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving (see Y1 and Y2).

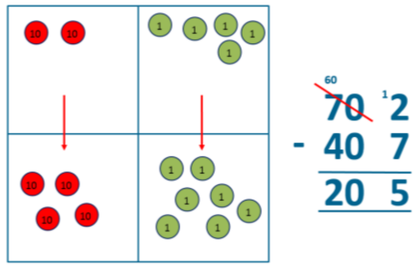
Children should make choices about whether to use complementary addition or counting back, depending on the numbers involved.

<u>Written methods (progressing to 3-digits)</u>

Introduce expanded column subtraction with no decomposition, modelled with place value counters (Dienes could be used for those who need a less abstract representation)



For some children this will lead to exchanging, modelled using place value counters (or Dienes).



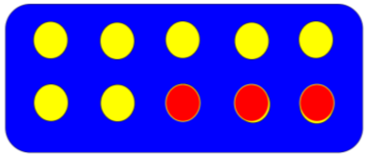
The above model would be introduced with concrete objects, which children can move (including cards with pictures) before progressing to pictorial representation. The use of other images is also valuable for modelling subtraction e.g. Numicon, bundles of straws, Dienes apparatus, multi-link cubes, bead strings

Mental Strategies

Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10.

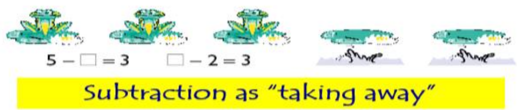
Children should memorise and reason with number bonds for numbers to 20, experiencing the = sign in different positions.

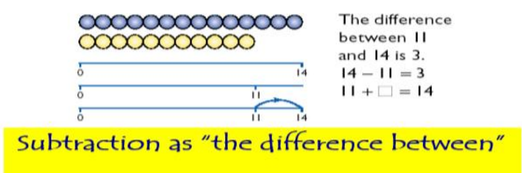
They should see addition and subtraction as related operations. E.g. 7 + 3 = 10 is related to 10 – 3 = 7, understanding of which could be supported by an image like this.

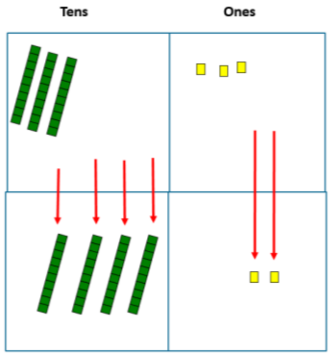


Use bundles of straws and Dienes to model partitioning teen numbers into tens and ones.

Children should begin to understand subtraction as both taking away and finding the difference between, and should find small differences by counting on.





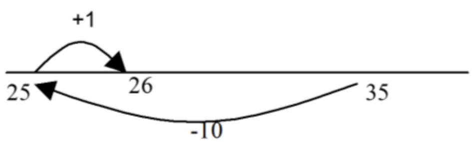


70	5
- 40	2
30	3

Mental Strategies

Children should count regularly, on and back, in steps of 2, 3, 5 and 10. Counting back in tens from any number should lead to subtracting multiples of 10.

Number lines should continue to be an important image to support thinking, for example to model how to subtract 9 by adjusting.



Children should practise subtraction to 20 to become increasingly fluent. They should use the facts they know to derive others, e.g using 10 - 7 = 3 and 7 = 10 - 3 to calculate 100 - 70 = 30 and 70 = 100 - 30.

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

A number line and expanded column method may be compared next to each other.

Some children may begin to use a formal columnar algorithm, initially introduced alongside the expanded method. The formal method should be seen as a more streamlined version of the expanded method, not a new method.

Mental Strategies

Children should continue to count regularly, on and back, now including multiples of 4, 8, 50, and 100, and steps of 1/10.

The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged.

Children should continue to partition numbers in difference ways.

They should be encouraged to choose the mental strategies which are most efficient for the numbers involved, e.g. counting up (difference, or complementary addition) for 201 – 198; counting back (taking away / partition into tens and ones) for 201 – 12.

Calculators can usefully be introduced to encourage fluency by using them for games such as ‘Zap’ [e.g. Enter the number 567. Can you ‘zap’ the 6 digit and make the display say 507 by subtracting 1 number?]

The strategy of adjusting can be taken further, e.g. subtract 100 and add one back on to subtract 99. Subtract other near multiples of 10 using this strategy.

Vocabulary

Hundreds, tens, ones, estimate, partition, recombine, difference, decrease, near multiple of 10 and 100, inverse, rounding, column subtraction, exchange

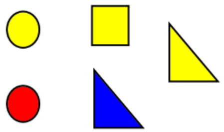
See also Y1 and Y2

Questions for Mastery and Reasoning

What do you notice? What patterns can you see?

Vocabulary
Subtraction, subtract, take away, distance between, difference between, more than, minus, less than, equals = same as, most, least, pattern, odd, even, digit,

Children could see the image below and consider, "What can you see here?" e.g.



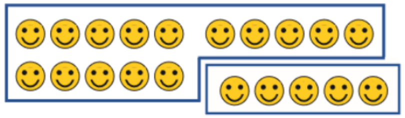
3 yellow, 1 red, 1 blue. 3 + 1 + 1 = 5
2 circles, 2 triangles, 1 square. 2 + 2 + 1 = 5
I see 2 shapes with curved lines and 3 with straight lines.

5 = 2 + 3
5 = 3 + 1 + 1 = 2 + 2 + 1 = 2 + 3

Questions for Mastery and Reasoning
How many more to make…? How many more is… than…? How much more is…? How many are left/left over? How many have gone? One less, two less, ten less… How many fewer is… than…? How much less is…?
What can you see here?
Is this true or false?

As well as number lines, 100 squares could be used to model calculations such as 74 – 11, 77 – 9 or 36 – 14, where partitioning or adjusting are used. On the example above, 1 is in the bottom left corner so that 'up' equates to 'add'.

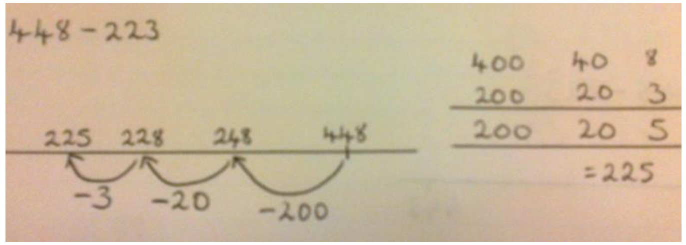
Children should learn to check their calculations, including by adding to check.
They should continue to see subtraction as both take away and finding the difference, and should find a small difference by counting up.
They should use Dienes to model partitioning into tens and ones and learn to partition numbers in different ways e.g. 23 = 20 + 3 = 10 + 13.



15 + 5 = 20

Vocabulary
Subtraction, subtract, take away, difference, difference between, minus
Tens, ones, partition
Near multiple of 10, tens boundary
Less than, one less, two less… ten less… one hundred less
More, one more, two more... ten more... one hundred more

When comparing two methods alongside each other: What's the same? What's different? Look at this number in the formal method; can you see where it is in the expanded method / on the number line



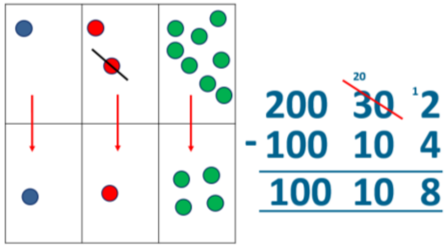
Subtraction at Ravensbury

Year 4

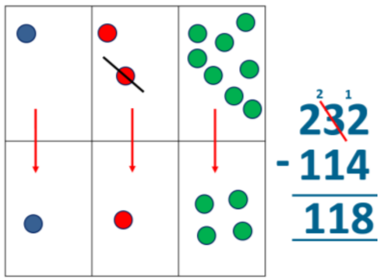
Missing number/digit problems: 456 + □ = 710; 1□7 + 6□ = 200; 60 + 99 + □ = 340; 200 – 90 – 80 = □; 225 - □ = 150; □ – 25 = 67; 3450 – 1000 = □; □ - 2000 = 900

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods (progressing to 4-digits)
Expanded column subtraction with decomposition, modelled with place value counters, progressing to calculations with 4-digit numbers.



If understanding of the expanded method is secure, children will move on to the formal method of decomposition, which again can be initially modelled with place value counters.



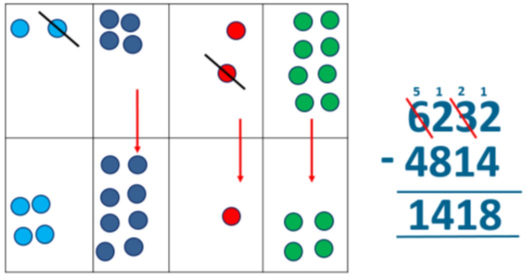
Mental Strategies
Children should continue to count regularly, on and back,

Year 5

Missing number/digit problems: 6.45 = 6 + 0.4 + □; 119 - □ = 86; 1 000 000 - □ = 999 000; 600 000 + □ + 1000 = 671 000; 12 462 – 2 300 = □

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods (progressing to more than 4-digits)
When understanding of the expanded method is secure, children will move on to the formal method of decomposition, which can be initially modelled with place value counters.



Progress to calculating with decimals, including those with different numbers of decimal places.

Mental Strategies
Children should continue to count regularly, on and back; now including steps of powers of 10.
The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.
Children should continue to partition numbers in different ways.

They should be encouraged to choose from a range of strategies:

- Counting forwards and backwards in tenths and

Year 6

Missing number/digit problems: □ and # each stand for a different number. # = 34. # + # = □ + □ + #.

What is the value of □? What if # = 28? What if # = 21
10 000 000 = 9 000 100 + □

7 – 2 x 3 = □; (7 – 2) x 3 = □; (□ - 2) x 3 = 15

<u>Mental methods</u> should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

<u>Written methods</u>
As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with decomposition to be secured.
Teachers may also choose to introduce children to other efficient written layouts, which help develop conceptual understanding. For example:

```
 326
-148
  -2
 -20
 200
 178
```

Mental Strategies
Consolidate previous years.

Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45

now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100. The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate. Children should continue to partition numbers in different ways. They should be encouraged to choose from a range of strategies: • Counting forwards and backwards: 124 – 47, count back 40 from 124, then 4 to 80, then 3 to 77 • Reordering: 28 + 75, 75 + 28 (thinking of 28 as 25 + 3) • Partitioning: counting on or back: 5.6 + 3.7, 5.6 + 3 + 0.7 = 8.6 + 0.7 • Partitioning: bridging through multiples of 10: 6070 – 4987, 4987 + 13 + 1000 + 70 • Partitioning: compensating – 138 + 69, 138 + 70 - 1 • Partitioning: using 'near' doubles - 160 + 170 is double 150, then add 10, then add 20, or double 160 and add 10, or double 170 and subtract 10 • Partitioning: bridging through 60 to calculate a time interval – What was the time 33 minutes before 2.15pm? • Using known facts and place value to find related facts. **Vocabulary** add, addition, sum, more, plus, increase, sum, total, altogether, double, near double, how many more to make..? how much more? ones boundary, tens boundary, hundreds boundary, thousands boundary, tenths boundary, hundredths boundary, inverse, how many more/fewer? Equals sign, is the same as. **Questions for Mastery** What do you notice? What's the same? What's different? Can you convince me? How do you know?	hundredths: 1.7 + 0.55 • Reordering: 4.7 + 5.6 – 0.7, 4.7 – 0.7 + 5.6 = 4 + 5.6 • Partitioning: counting on or back - 540 + 280, 540 + 200 + 80 • Partitioning: bridging through multiples of 10: • Partitioning: compensating: 5.7 + 3.9, 5.7 + 4.0 – 0.1 • Partitioning: using 'near' double: 2.5 + 2.6 is double 2.5 and add 0.1 or double 2.6 and subtract 0.1 • Partitioning: bridging through 60 to calculate a time interval: It is 11.45. How many hours and minutes is it to 15.20? • Using known facts and place value to find related facts. **Vocabulary** Tens of thousands boundary, *Also see previous years* **Questions for Mastery and Reasoning** What do you notice? What's the same? What's different? Can you convince me? How do you know?	**Vocabulary** Tens of thousands boundary, *Also see previous years* **Questions for Mastery and Reasoning** What do you notice? What's the same? What's different? Can you convince me? How do you know?