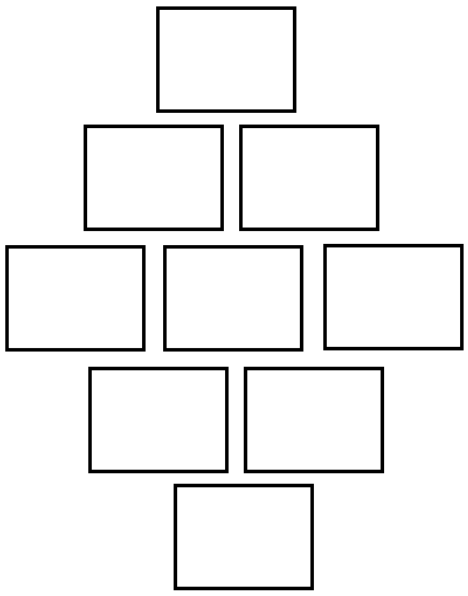
Planning Overview
Year 6 Addition and Subtraction

Perform mental calculations, including with mixed operations and large numbers
Use their knowledge of the order of operations to carry out calculations involving the four operations
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

6AS/MD–1 Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number).
6AS/MD–2 Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.

	Teaching and Learning
Recap on mental strategies for addition and subtraction	Recap on key addition strategies using the rhombus nine activity below. Ask children to sort the calculations from the easiest (at the top of the rhombus) to the hardest (at the bottom of the rhombus). They must then explain why and the strategy they used to solve it.  4 - 1.15 = 122,456 + 1,999 = 50,000 - 500 = 5,494 - 2,516 = 2.5 + 0.05 = 840,000 + 80,000 = 2006 – 1978 = 32.18 - 7.99 = 6,155 + 501 + 649 =

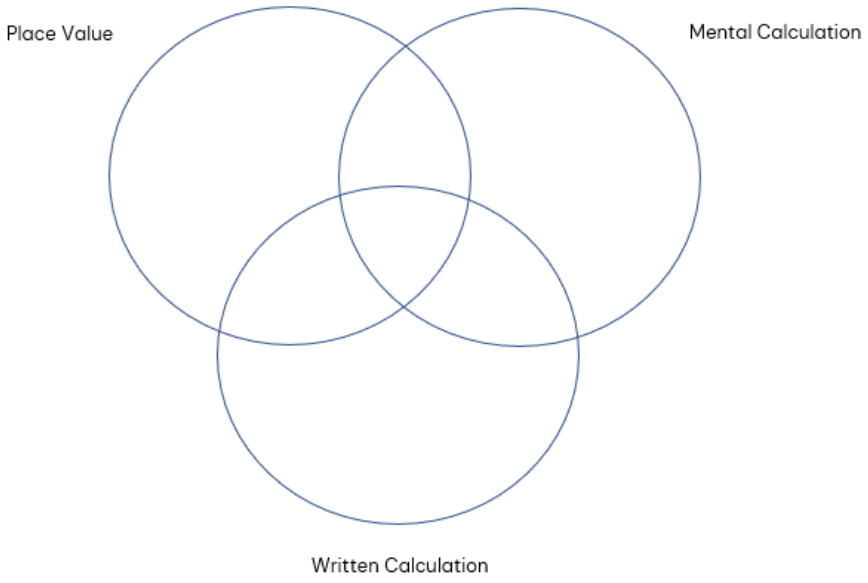
Mastery

Two numbers have a difference of 2·38. The smaller number is 3·12.
What is the bigger number?

Two numbers have a difference of 2·3. They are both less than 10.
What could the numbers be?

Take addition and subtraction questions from previous arithmetic papers. Can the children sort them into a Venn Diagram and discuss the strategies they would use to solve the problem? Discuss with the children examples of which calculation could be placed in each section, particularly the overlapping sections.

e.g If you can calculate one of them in your head but need to make a jotting, that would be sorted in to written calculation and mental method.



Mastery with Greater Depth

Jasmine and Kamal have been asked to work out 5748 + 893 and 5748 – 893.

Jasmine says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the addition by adding on 1000 and then taking away 100 and then taking away 7.'

What answer does Jasmine get, and is she correct?

Kamal says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the subtraction by taking away 1000 and then taking away 100 and then taking away 7.'

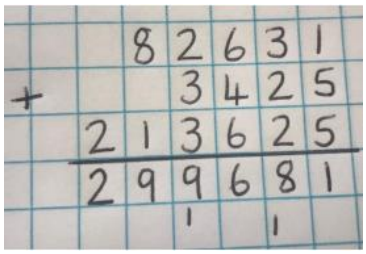
What answer does Kamal get, and is he correct?

If you disagree with either Jasmine or Kamal, can you correct their reasoning?

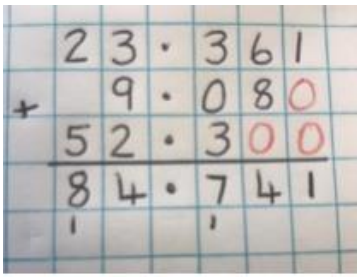
Use estimation to support calculation	Discuss with the children why it might be good to estimate an answer before you tackle a calculation. Recap on rounding to support estimation. Provide the children with a calculation e.g. 3795 + 4112. What would be a good estimation for the answer? How could we use rounding to help us? What would the best numbers be to round to? Model rounding to the nearest 1000. 4000 + 4000 = 8000. What is the actual answer? Is your estimation near? Can it help you check you have the right answer? What about if we round this number to the nearest 100 or nearest 10? Will the estimation be more precise? However, is the calculation easy to do mentally? Therefore, which would be the best estimation? When working with larger numbers, what degree of accuracy would be best to round to? Ask children to discuss with a range of calculations. 879,456 + 78,523 1,234,534 + 5,465,758 4,654,798 + 31,978 Discuss with the children the difference that context makes. How would your estimation change when discussing the population of countries compared with the amount of seats required in a stadium? Which would need to be rounded to a smaller degree of accuracy? Why? Alice has completed these calculations. How would estimation have helped her to know that her answers are wrong? 89,994 + 7,643 = 82,351 856,923 – 697,785 = 159,138 9 – 4.035 = 4.026 Estimation can now be consolidated as the children recap written strategies with larger numbers. Ensure that the children estimate the answer to each question before solving them.

Recap on written strategies for addition and subtraction

Ensure children are confident with column addition and column subtraction, providing opportunities to practise fluency of these skills with a variety of 6 and 7-digit numbers.



This should include addition several numbers with different numbers of decimal places (including in the context of measures and money).



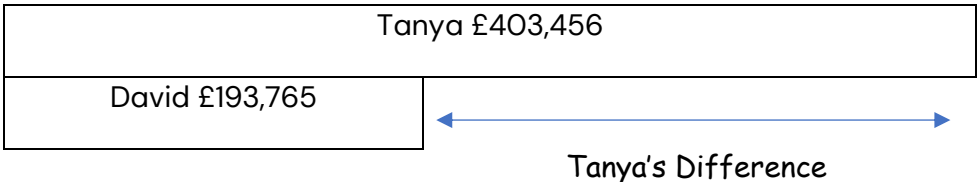
Mastery

Calculate 36·2 + 19·8

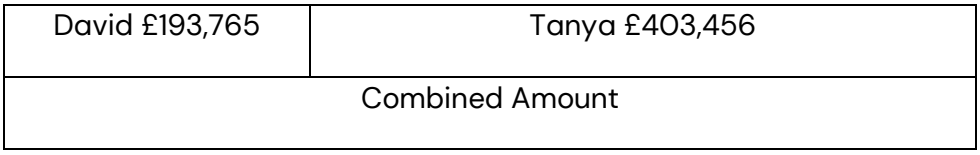
- with a formal written column method
- with a mental method, explaining your reasoning.

Explore a variety of word problems involving addition and/or subtraction including for large numbers and decimals. Encourage the use of a bar model to represent the questions before solving it. Discuss the mathematical vocabulary for both addition and subtraction.

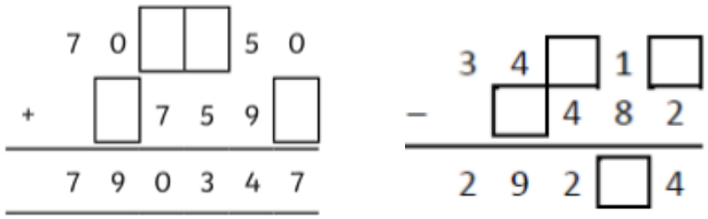
e.g Tanya sold her house for £403,456 and David sold his for £193,765. How much more did Tanya's sell for?



They decide to use their money to buy a house together. How much have they got to spend on another house?

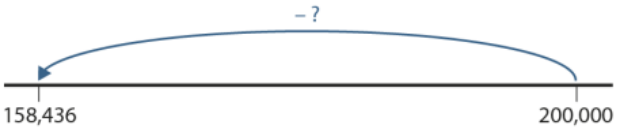


Children should then apply their knowledge to missing digit calculations.

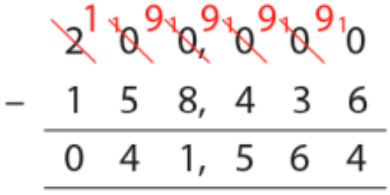


Now introduce the context of money.
A charity aims to raise £200,000 over a year. So far it has raise £158,436. How much more does it need to raise to reach its target? What would be the most efficient way to complete this calculation?

Mental method – number line:

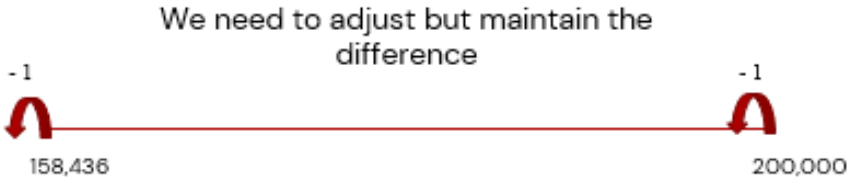


Written method – column subtraction:

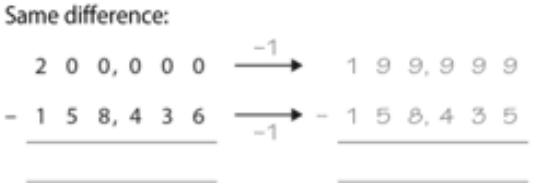


NCETM PD materials

Explore the strategy below where you decrease both numbers by 1 to make the calculation easier to solve.



Same difference:



NCETM PD materials

<table>
<tr><td></td><td>Provide children with other examples where they could use this skill.
300,000 – 56,875 =
1,000,000 – 875,375 =
90,000 – 35,879 =

Explore all of the strategies taught by sorting the following calculations and ask them to explain why they have sorted them as they have.

<table><tr><th>Mental method</th><th>Written method</th></tr><tr><td></td><td></td></tr></table>

204,567 – 20,000 =
30,000 – 8,999 =
86,432 – 4,000 =
324 + 5,000 + 4,000,000 =
9,000,000 – 653,048 =
34,164 – 15,678 =
204,535 + 87,456 =
2,050,345 – 89,768 =</td></tr>
<tr><td>Two Step Problems</td><td>Expose the children to a variety of mixed problems. Can they see the steps in the problems? Model the use of the bar model to help highlight the steps in the problem. Integrate past SATs questions for the children to tackle. Ensure that you cover the different vocabulary for addition and subtraction that may arise.

Note: Year 6 level questions will include a range of the four operations. However, you will need to ensure that children are secure with multi-step addition and subtraction questions before moving on.

e.g.
At the start of June, there were 1,793 toy cars in the shop.

During June,

• 8,728 more toy cars were delivered

• 9,473 toy cars were sold.

How many toy cars were left in the shop at the end of June?</td></tr>
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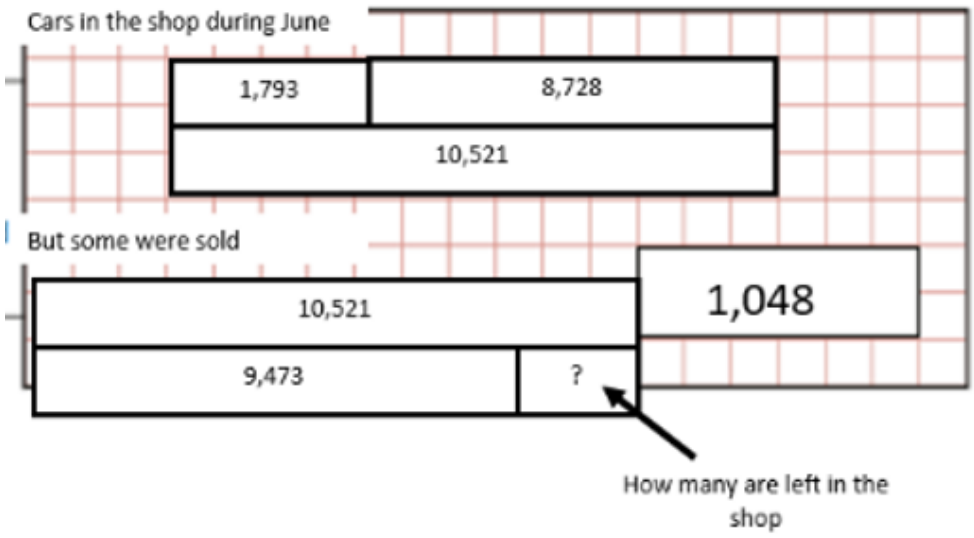

Here are three supermarket bills.

a) Tom rounds each bill **to the nearest £10** and then adds them up. What is the total amount that Tom gets?

b) Mary adds up the three bills **exactly**. What is the total difference between her total and Tom's total?

Mastery

A shop sells magazines and comics. Freya buys a magazine and a comic. She pays £2·50. Evie buys a magazine and two comics. She pays £3·90.

How much does a comic cost? How much does a magazine cost?

A shop sells boxes of chocolates. One box costs £3·99. A second box costs £2·60. A third box costs £6·45.

What is the difference in price between the most and least expensive boxes?

The shop also sells packets of sweets. One packet costs £1·39. Ramesh has a £10 note and he wants to buy the chocolates costing £2·60.

How many packets of sweets can he also buy?

Mastery with Greater Depth

A shop sells magazines and comics. Last week Arthur bought a magazine and a comic. He can't remember exactly what he paid, but he thinks he paid £1·76. Yesterday he bought a magazine and four comics. He paid £4·30.

Do you think he is remembering correctly when he says that he paid £1·76 last week?