All Saints C of E Primary School

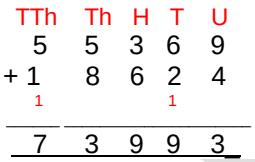
Year 6 Addition and Subtraction

By the end of Year Six, children have been taught to:

<table>
<tr><th>Objective</th><th>Why is it important? Things to watch out for! Taught strategies</th></tr>
<tr><td>Solve addition and subtraction multi-step problems in context, deciding which operation and method to use and why</td><td>
Problem solving involves the application of previously taught skills. This relies on many things, such as; the ability to recall key number facts, mathematical vocabulary, concepts, strategies, reasoning and the understanding of the problem. A child also needs the ability to know which aspect of maths they need to apply. A child may be fantastic at finding the answer to addition and subtraction column calculations. However, unless he/she is able to apply this to word problems, he can become extremely frustrated. Understanding what the problem is asking them to do is crucial!
When supporting a child there are a few things you can do such as:
• Read the problem more than once
• Underline the important information
• Imagine what is happening in the problem to understand the maths that needs doing
• Stop and think about an efficient strategy to use
• Work logically and slowly though the problem
• Not panic!
• Re-read the problem to check the answer is reasonable.

For children to be able to calculate accurately they need to be able to apply the correct strategy accurately.

COMPACT COLUMN ADDITION


TTh Th H T U
5 5 3 6 9
+ 1 8 6 2 4
1 1
7 3 9 9 3

The positioning of where children carry the values over to is very personal. As long as it is somewhere that children will remember to add it back in, is all that matters. Some children prefer to carry the value below the line, whereas others prefer to carry it above

Year 6 children have experienced expanded column strategies in previous years and when secure moved onto compact column addition with larger values. However, even as a Year 6 if a child does not show confidence with place value and using this strategy accurately time will be spent revisiting the expanded column strategy to ensure the child has a secure foundation to build their mathematical understanding on.
Errors sometimes occur when:
• Children do not carry the value – for example when adding 9+4 they only write the 3 and forget about the 10 of the 13.
• Children forget to add carried values back into the particular column. For example in the tens column of the example a child may add 6+2 rather than 6+2+1.
Children have very mixed views about this strategy – some children love it and say that it is easier and why didn't we teach it to them in the first place; whereas others do not get on with it at all.

Many would say that the compact method is easier. However, if it is taught too soon or the child does not have a sound understanding of place value, he/she will only be able to add single digit values up to 9 and not develop an understanding of larger values. Children have to have a strong understanding of place
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	value so they can recognise when an answer is not reasonable. For example, if a child calculates 5962+4382= 6789, obviously something has gone wrong, he/she has not recognised that it cannot possibly be right because 5000+4000=9000 and his/her answer is considerably lower than that.
COMPACT COLUMN SUBTRACTION 3864-1437= Th H T U 3 8 5 ~~6~~ 1 4 - 1 4 3 7 2 4 2 7 MORE COMPLEX 5 2962- 11789= TTh Th H T U 15 5 2 8 ~~9~~ 5 ~~6~~ 1 2 - 1 1 7 8 9 4 1 1 7 3 2500 – 1479 = Th H T U 2 4 ~~5~~ 9 ~~0~~ 1 0 - 1 4 7 9 1 0 2 1 **This needs a little explanation!** We cannot subtract nine from 0 so we need to borrow from the tens column. However, there is a zero so we cannot. Therefore, we need to borrow from the hundreds column. The hundred that we have borrowed has to be shared out between the tens and units column – 90 to the tens and 10 to the units.	Year 6 children have experienced *expanded column* strategies in previous years and when secure they have moved onto *compact column strategies* with larger values. However, even as a Year 6 child, if a child does not show confidence with place value and using this strategy accurately, time will then be spent revisiting the *expanded column* strategy to ensure the child has a secure foundation on which to build their mathematical understanding. There is a lot that can go wrong in subtraction and children often find it a lot more challenging than addition. Errors sometimes occur when: • Children calculate 7- 4 in the example, not realising that the calculation is actually 4 - 7. In this instance, the child has made the values work and subtracted the lower number from the higher number and has therefore not understood that actually we cannot subtract 4 from 7 in this situation. Put into context, we cannot take seven pence away from 4 pence! • Children forget to reduce the tens or hundreds value by 10 or 100 after borrowing and therefore would leave 60 as 60 rather than reducing it to 50.. • When children have borrowed from the tens column, they write 10 next to the 4 in the units column making 104 , rather than adding the 10 to the 4 to make 14. Children have very mixed views about this strategy – some children love it and say that it is easier and why didn't we teach it to them in the first place; whereas others do not get on with it at all. **Children have to go through the process of *expanded column* methods to be able to move onto *compact* methods to ensure that their understanding of place value is secure and that they have the ability to recognise whether an answer would be reasonable or not.** **Once children are secure with the strategy, they can go on to subtracting with much larger values using these key principles.**

<table>
<tr><td></td><td><u>Examples of problems</u>
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?</td></tr>
<tr><td>Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</td><td>Estimating is a key skill in helping children to recognise when an answer is roughly accurate. It is a real skill to acquire because children have to be able to think about rounding values to amounts which are quicker to calculate mentally.

ADULT: Can you estimate what the total amount of money I would have if I had £23.65 and then someone gave me 11.87p?
If a child gave an estimate of £36.00 that would be a reasonable estimate because he/she may have rounded £23.65 to £24.00 and then rounded £11.87p up to £12.00, so calculating £24.00+£12.00. Whereas, if a child gave an estimate of £42.00, he/she would not have thought about the relative values of each amount and what the total would be when the values are combined. When children learn how to give rough estimates, they are able to check whether their final answers are reasonable, once they have calculated them with a strategy.</td></tr>
<tr><td>Perform mental calculations</td><td>Alongside formal calculating strategies, children are taught mental strategies which enable them to calculate more efficiently. Using known number facts, previously taught mental strategies and often just thinking about what they know about the numbers can help them. Knowing which fact to draw upon or which strategy to apply is a real indicator as to how secure children are in their strategies. Number facts and strategies taught in Key Stage One are the foundations which allow older children to be able to calculate efficiently and accurately.
For example; having the knowledge (and just knowing it) that 6+3=9, allows children to apply this knowledge to other situations. This is why knowing number facts and number bonds to10 is so crucial to building mathematically strong foundations.

<table>
<tr><td>6+3=9

9-3=6</td><td>60+30=90

90=30=60</td><td>600+300=900

900=-300=600</td><td>6000+3000=9000

9000-3000=6000</td><td>0.6+0.3=0.9

0.9-0.3=0.6</td><td>0.06+0.03=0.09

0.09 -0.03 =0.06</td></tr>
</table>

If a child is still using fingers to count to find the total of 9+4, then his/her mental strategies and number bonds are not secure. More work is needed to help the child develop the fluency in calculating.
Using known facts to support is essential, for example by breaking down the calculation 9+4 to make it easier e.g. 9+1=10 and then +3 . In this instance, the child knows that one more than 9 will get him/her to the ten which will make the calculation easier. He then partitions four into 3 and 1 to be able to mentally calculate 9+1=10 and then adds on the 3 to make 13 altogether.

Using what children know about values – Sometimes when asked to calculate, children automatically go to the formal strategies they have been taught before stopping and thinking about what they know about the values. When asked to calculate 6012-5999 – if a child starts to set out the calculation in a formal column addition format they may well get the correct answer, although he will take a lot longer to calculate it. If children stop and think about what they know about the values they will recognise that 5999 is nearly 6000, so mentally they could calculate 6012-6000= 12 and then add one back in because they rounded 5999 to 60000.</td></tr>
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	Calculating mentally is a lot like juggling! We know where the values are, we have the skills and strategies, and we know what we need to do with them, so we just need to make sure we don't drop (forget) anything!  Try some of these: - 3127 take away 35… - Increase 5.9 by 0.8 - Take 80 from 373… - What is the sum of 0.07, 1.03 and 6.1? - 6678 subtract 105… - Subtract 500 from 22525 - 5000 less than 7200 - Add 0.7 to 3.1

year 6