All Saints C of E Primary School

Year 4 Addition and Subtraction

By the end of Year Four, 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>Add up to 4 digit using column methods</td><td>
<u>Progression from expanded column to compact column addition</u>
<table>
<tr><td>267 + 158
H T U
200 60 7
+100 50 8
100 10
300 20 5 = 325</td><td>To ensure children retain the understanding of the relative values of the numbers, expanded column addition is used.

Due to the fact that the children would have been taught this strategy in Year 3, we are able to calculate with larger values and consolidate previously taught concepts.

Errors sometimes occur when:
• Children do not carry the value – for example when adding 7+8 they may write 15 under the line, rather than realising that the 10 in the 15 is too large to be in the units column.
• Children forget to add carried values back into the particular column. For example in the tens column of the example a child may add 60+50 rather than 60+50+10.

If a child is still using fingers to count to find the total of 7+8, 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 double 7 is 14, add one more and the answer is 15.</td></tr>
<tr><td>H T U
3 6 7
+ 1 6 8
1 1
5 3 5

H T U
300 60 7
+ 100 60 8
100 10
500 30 5 = 535

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.</td><td>At this point, if children are secure and can demonstrate understanding of the above strategy and can explain what is happening, they are then introduced to compact column strategies. We spend time comparing the strategies by asking questions such as: what is the same and what is different? Why is it different?

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, children will only be able to add single digit values up to 9 and not develop an understanding of larger values.

Children have to go through the process of expanded column methods to be able to move onto compact methods. They have to ensure their understanding of place value is secure and they have the ability to recognise whether an answer would be reasonable or not.</td></tr>
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Subtract up to 4 digits using column methods

Progression from *expanded column subtraction* to *compact column*

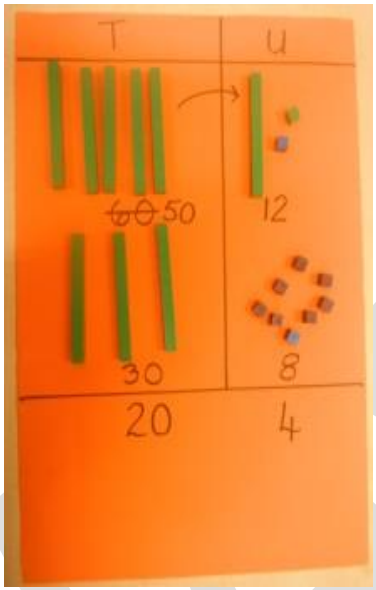
69-23=

	T	U
	60	9
-	20	3
	40	6 = 46

62-38

	T	U
	~~60~~ 50	12
-	30	8
	20	4

A ten from the tens column is borrowed and added to the units column allowing the calculation to be carried out and be accurate. This step is vital in developing children's understanding, which is why we use equipment to reinforce visually what is happening. The top row is still 62 even though it is now spread across two columns as 50 and 12.



At the beginning of Year 4, children need to spend time consolidating their understanding of *expanded column subtraction* before moving onto subtracting values that involve borrowing values. A lot of time is taken at this stage using equipment to reinforce the value of numbers in each column and the movement of values between the tens and units columns.

Errors sometimes occur when:

- Children calculate 8-2 in the example and not realising that the calculation is actually 2-8. 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 8 from 2 in this situation.
- Children forget to reduce the tens value by 10 after borrowing and they therefore would leave 60 as 60.
- When children have borrowed from the tens column, they write 10 next to the 2 in the units column making 102 , rather than adding the 10 to the 2 to make 12.

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	363 – 154 = H T U 300 ~~60~~ 50 13 - 100 50 4 200 0 9 = 209 More complex 363 – 174 = 150 ~~300~~ 200 ~~60~~ 50 13 - 100 70 4 100 80 9	Once children are secure in borrowing value, we deepen their understanding by using larger values.
	62-38= ~~6~~5 12 - 3 8 2 4 = 24 then move onto 3 digit MORE COMPLEX 962-789= 15 8 ~~9~~ 5 ~~6~~ 12 - 7 8 9 1 7 3 =173 This often needs a little more explanation! – 2 zeros in the top row 9 ~~3~~2 1~~0~~ 10 - 1 2 4 1 7 6	At this point, if children are secure and can demonstrate their understanding of the above strategy and can explain what is happening, then they are introduced to compact column strategies. Whenever we introduce a new strategy or way of working, we take a step back to ensure the understanding of the strategy and then we move on to the one in the example. 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.**
Estimate and use *inverse operations* to check answers to a calculation	*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 £3.65 and then someone gave me 1.87p? If a child gave an estimate of £5.50 that would be a reasonable estimate because he/she may have rounded £3.65 to £3.50 and then rounded £1.87p up to £2.00, so calculating £3.50+£2.00. Whereas, if a child gave an estimate of £8.46, he/she would not have thought about the relative values of each amount and what the total would be when they 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.	

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Inverse operations are opposite operations – one reverses the effect of the other. We talk about the *inverse* to explain how addition and subtraction are linked. For example, 100g – 60g = 40g To check the calculation we would need to add the values 60g+40g = 100g. If the answer is 100g, the initial calculation is correct, alternatively if the values are different an error has been made.
We often use *inverse operations* to help us solve missing number problems. The shape just shows that a value is missing, it does not matter what the shape is it shows that a value is missing. Developing this concept makes links to simple algebra, for example a+5=9 *a* is the missing value, therefore we apply our knowledge of inverse operations to work this out.

352 + = 480 We calculate 480-352 to find the missing value.

70 + 99 +  = 270 *We calculate 70+99 and then calculate the difference between the addition total and 270.*

 – 55 = 84 *We calculate 84+55* knowing that the value has to be larger than the two numbers present in the calculation.

 - 3000 = 600 We calculate 6000+3000 knowing that the value has to be larger than the two numbers present in the calculation.

Looking back at the calculations when complete is crucial to check that the values are reasonable and that they satisfy the rules of addition and subtraction; the answer to an addition (when using positive whole numbers) is greater than the values being added; the answer to a subtraction(when using whole positive numbers) is less than the largest value.

Solve + and – two step problems in context, deciding which operations and method to use and why

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

<u>Examples of problems</u>

These are the prices of coconuts and bananas.

A shop sells greetings cards. Each card has a price code on it. These are the codes.

code	price
AA	75p

Tina buys two cards. One card has code AA on it. The othe
Tina pay?

Omar buys a card. He pays with a £2 coin. He gets

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coconuts
78p each



bananas
£1.20 for 1kg

Josh buys one coconut and half a kilogram of bananas. How much does he spend altogether? Oranges cost 25p each. How many oranges can Josh buy for £1.50?

BB	£1.15
CC	£1.55
DD	£1.70
EE	£1.99

45p change. What is the code on his card?

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