

Unit 3

Written methods of addition and subtraction

Five daily lessons

*National
Numeracy Strategy*

Year 4

Spring term

Unit Objectives

Year 4

- Use informal pencil and paper methods to support, record or explain additions/subtractions.
- **Develop and refine written methods for: column addition and subtraction of two whole numbers less than 1000 and addition of more than two such numbers; money calculations.**

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Year 3

Link Objectives

Year 5

- Use informal pencil and paper methods to support, record or explain $\text{HTU} \pm \text{TU}$, $\text{HTU} \pm \text{HTU}$.
- Begin to use column addition and subtraction for $\text{HTU} \pm \text{TU}$ where the calculation cannot easily be done mentally.

(Key objectives in bold)

- Use informal pencil and paper methods to support, record or explain additions and subtractions.
- **Extend written methods to: column addition/subtraction of two integers less than 10 000; addition of more than two integers less than 10 000; addition or subtraction of a pair of decimal fractions, both with one or both with two decimal places.**

This Unit Plan is designed to guide your teaching.

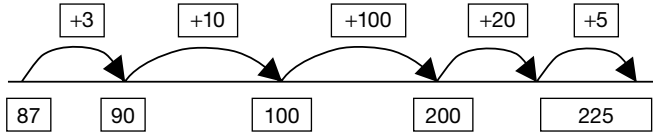
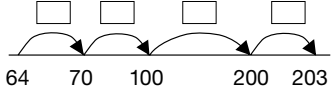
You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Resource sheet 3.1
- Resource sheet 3.2
- Resource sheet 3.3
- Resource sheet 3.4
- Resource sheet 3.5
- OHT 3.1
- Arrow cards
- Whiteboards
- Timer

Planning sheet	Day One	Unit 3 <i>Written methods of addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Add and subtract multiples of 10 to 100.</p> <p>VOCABULARY add subtract total sum difference decide</p> <p>RESOURCES Resource sheet 3.1</p>	<ul style="list-style-type: none"> From Resource sheet 3.1 give each child a set of decade cards 10–90. Ask questions that involve addition and subtraction of multiples of ten. Children hold up cards in response to: <div>Q Show me the answer to 20 + 60, 10 + 20 + 30, 70 – 40, 90 – 20, 80 + 30 – 20 ... best deal?</div> <div>Q Show me two numbers that total 120, 150, 160, ...</div> <div>Q Show me three numbers that total 140, 180, 200, ...</div> <div>Q Show me the difference between 70 and 40, 130 and 90, 110 and 60.</div> <div>Q Show me two numbers with a difference of 30, 40, 20, ...</div> Reinforce the link between the number facts to 20 and adding and subtracting 'decade' numbers. 	<p>Use informal pencil and paper methods to support, record or explain additions.</p> <p>VOCABULARY addition total</p> <p>RESOURCES Arrow cards</p>	<ul style="list-style-type: none"> Write on the board $\square\square + \square\square$. Give children 4 single-digit numbers, and ask them to make the largest total they can using the four numbers to make 2 two-digit numbers. Discuss the answers and the mental methods used. Pick 2 two-digit numbers and demonstrate the expanded method of addition e.g. $46 + 38$ $\begin{array}{r} 46 \\ + 38 \\ \hline 70 \\ 14 \\ \hline 84 \end{array}$ <p>Give children examples to work through and check their answers and methods.</p> Repeat the activity with six digits and $\square\square\square + \square\square\square$. Discuss the methods and talk about the fact that these might be more difficult to calculate mentally, so using a 'vertical' method can be helpful. Write on the board: $\begin{array}{r} 384 \\ + 267 \\ \hline 500 \rightarrow 300 + 200 \\ 140 \rightarrow 80 + 60 \\ 11 \rightarrow 4 + 7 \\ \hline 651 \end{array}$ <p>Talk through the method, adding hundreds, tens then units</p> <p>Check that the children understand each step and repeat. Use arrow cards to show the expanded notation for each number if children are having difficulties understanding the method.</p> Write 6 single-digit numbers on the board. Children work in pairs. They make 2 two-digit numbers and use the informal written method to calculate their total. Extend to children forming and adding 2 three-digit numbers. Repeat. <p>Collect answers and correct mistakes and misunderstandings.</p> <div> <p>Guidance statement</p> <ul style="list-style-type: none"> This is a suggested expanded method for addition. Your school's agreed policy may require you to use a different <i>expanded</i> method. </div>	<ul style="list-style-type: none"> Write the numbers 38, 147, 219 and 356 on the board. Ask individual children to choose any two numbers and total them. They write the method on the board and describe the process to the rest of the class. Discuss each addition and consolidate the written method. <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Use and explain an extended vertical method for adding 2 three-digit numbers. <p>(Refer to supplement of examples, section 6, page 48.)</p> </div>

Planning sheet	Day Two	Unit 3 <i>Written methods of addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Add single-digit numbers to two-digit numbers, crossing the tens boundary.</p> <p>VOCABULARY add subtract calculation</p>	<ul style="list-style-type: none"> Write $37+6$ on the board. <div> Q How would you quickly work out the answer to $37+6$? </div> Draw out $30+(7+6)$ or $(37+3)+3$. See Framework p.46 (section 6). <u>Suggest</u> Add a single digit to any three- or four-digit number, crossing the tens boundary. Use examples like: $629+3$, $6745+8$ Discuss the method they prefer and give further examples e.g. $45+5$, $56+8$, ... Play a 'number chain' game as a class. Give the first child a calculation such as $28+4$. They respond with the answer and state a single-digit number for the next child to add to the cumulative total, and continue, e.g. $28+4 \rightarrow 32+6 \rightarrow 38+9 \rightarrow 47+5 \rightarrow$ etc. $28+10 \rightarrow 38+30 \rightarrow 68+20 \rightarrow 88+40 \rightarrow 128$ etc. Extend to $128+10 \rightarrow 138+30 \rightarrow 168$ etc. The class try to continue the chain to make 100. Recap on the preferred methods the children used for addition and write six additions on the board for the children to do in one minute. 	<p>Develop and refine written methods for column addition of two whole numbers less than 1000.</p> <p>VOCABULARY addition sum total</p> <p>RESOURCES OHT 3.1 Whiteboards</p>	<ul style="list-style-type: none"> Show OHT 3.1. Pick 2 two-digit numbers and ask children to find their sum. Children to show their answer on whiteboards. Repeat using a two-digit and a three-digit number, then 2 three-digit numbers. Work through the additions with the children. Identify those for which children needed a written method. Remind them of the method using $586+194$. <div> $\begin{array}{r} 586 \\ + 194 \\ \hline 600 \rightarrow 500+100 \\ 170 \rightarrow 80+90 \\ 10 \rightarrow 6+4 \\ \hline 780 \end{array}$ </div> Set children the task of choosing and adding pairs of two-digit or three-digit numbers from OHT 3.1. Discuss the methods used. Reinforce the importance of deciding whether to use a mental or written method depending on the numbers. Children work individually adding up pairs of numbers. Ask them to record two additions that they can answer mentally and two that need a written method. Collect responses and correct any mistakes. <div> Q What helped you to decide if you could do the addition in your head? </div> Using OHT 3.1, in small groups set children the challenge to find two numbers with: <ul style="list-style-type: none"> the largest total the smallest total the total nearest to 500 a total between 800 and 900 an even total greater than 600. 	<ul style="list-style-type: none"> Discuss the 'challenge'. <div> Q Which pairs of numbers make the largest total? Q Which is the smallest total you can make? Q Which total is nearest 500? </div> Ask the children how they decide whether to use a mental or written method. Share the ideas. <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Decide whether to use a mental or written method to total two numbers; Use an extended vertical method for adding 2 three-digit numbers. <p>(Refer to supplement of examples, section 6, page 48.)</p> </div>

Planning sheet	Day Three	Unit 3 <i>Written methods of addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Recall addition and subtraction facts for each number to 20.</p> <p>VOCABULARY how many more how many fewer difference</p> <p>RESOURCES Resource sheet 3.2</p>	<ul style="list-style-type: none"> Give each child Resource sheet 3.2. Ask children to point to the number they need to add to the number you give them to make 20. Ask the children to subtract the number you give them from 20 and point to the answer. Use a range of vocabulary for addition and subtraction e.g. <div>Q How many more do I need to add to ____ to make 20?</div> <div>Q How many fewer is ____ than 20?</div> <div>Q What is the difference between 20 and ____?</div> <p>Extend Ask children to point to the number they need to add to the number you give them to make 15, 16, 17, 18 or 19. (Need to include number facts for <u>each number</u> to 20.)</p>	<p>Develop and refine written methods for subtraction building on mental methods.</p> <p>VOCABULARY count on difference between</p>	<ul style="list-style-type: none"> Read problem from card: <div>Q A TV costs £225. Sally has saved £87. How much more does she need to save to buy the TV?</div> Discuss the problem. Ask the children for the calculation they need to make to answer the question. <div>Q How can we use the empty number line to help us do the subtraction?</div> On the board, work through the calculation with the children.  You may wish to demonstrate how this can be set out in another way. (Seek advice from school's agreed policy). $\begin{array}{r} 225 \\ - 87 \\ \hline +3 \rightarrow 90 \\ +10 \rightarrow 100 \\ +100 \rightarrow 200 \\ +20 \rightarrow 220 \\ +5 \rightarrow 225 \\ \hline \end{array}$ $100 + 20 + 10 + 3 + 5 = 138$ Demonstrate how to use this method for HTU – HTU. Give children other HTU – HTU calculations. Collect answers, discuss methods and correct mistakes. 	<ul style="list-style-type: none"> On the board draw  <div>Q What calculation does this represent?</div> <p>Children may suggest: $64 + 139 = 203$ or $203 - 139 = 64$</p> <p>Emphasise the subtraction.</p> <div>Q What number goes in each box?</div> Get children to suggest steps and fill in on board. Repeat with two other two-digit and three-digit numbers. On the board write: $\begin{array}{rcl} +6 & \rightarrow & 40 \\ +60 & \rightarrow & 100 \\ +300 & \rightarrow & 400 \\ +45 & \rightarrow & 445 \end{array}$ <div>Q What calculation does this represent?</div> <p>Discuss the steps and the calculation.</p> <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none"> Use an extended vertical written method for subtraction building on mental methods. <p>(Refer to supplement of examples, section 6, page 50.)</p>

Planning sheet	Day Four	Unit 3 <i>Written methods of addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Recall subtraction facts for each number to 20 and for multiples of 10.</p> <p>VOCABULARY minus subtract difference decrease less</p> <p>RESOURCES Resource sheet 3.3 timer</p>	<ul style="list-style-type: none"> Revise subtraction facts for <u>each number</u> to 20. <div> <div>20 – 19</div> <div>19 – 0</div> <div>18 – 18</div> <div>–18</div> <div>–1</div> <div>18 – 17</div> <div>etc.</div> <div>–2</div> <div>18 – 16</div> <div>etc.</div> <div>100 – 100</div> <div>90 – 90</div> <div>100 – 90</div> <div>90 – 80</div> <div>100 – 80</div> <div>etc.</div> <div>etc.</div> </div> Use Resource sheet 3.3 cut into 21 cards. Give out cards. Play ‘follow me’. Note the time the children take. Repeat and record time. Set challenge for next lesson. Ask children for the answer to 14–8. Ask for the answer to 140–80. Repeat and discuss methods and use of known facts. 	<p>Develop and refine written methods for column subtraction of two whole numbers less than 1000.</p> <p>VOCABULARY difference largest smallest nearest to 100</p> <p>RESOURCES OHT 3.1 Whiteboards</p>	<ul style="list-style-type: none"> Show the OHT 3.1. Pick 2 two-digit numbers and ask children to find the difference between the numbers and show their answer on whiteboards. Repeat using a three-digit and a two-digit number, then 2 three-digit numbers. Work through the questions with the children. Discuss methods used. Some children may use number line or written method. Consolidate the written method working through examples on the board e.g. 586–194. <div> <div> <div>586</div> <div>– 194</div> <div>+</div> <div>6</div> <div>→ 200</div> <div>+</div> <div>300</div> <div>→ 500</div> <div>+</div> <div>86</div> <div>→ 586</div> </div> <div>300 + 86 + 6 = 300 + 92 = 392</div> </div> Children work individually subtracting pairs of numbers. Ask them to record two subtractions that they can answer mentally and two where they need a written method. Collect responses and correct any mistakes. <div> <div>Q What helped you to decide if you could do them in your head?</div> </div> Using OHT 3.1, in small groups set the children a challenge to find two numbers with: <ul style="list-style-type: none"> the smallest difference the greatest difference the difference nearest 70 a difference between 100 and 200 an even greater difference. 	<ul style="list-style-type: none"> Discuss the challenge <div> <div>Q Which pair of numbers give the smallest difference?</div> <div>Q Which pair of numbers give the largest difference?</div> <div>Q Which pair of numbers give a difference nearest to 70?</div> </div> Ask children how they arrived at the answer. <div> <div>Q What clues did you use to help you?</div> <div>Q What did you do in your head?</div> </div> <p>HOMEWORK – Give children 6 three-digit numbers: 243, 471, 526, 337, 252, 487.</p> <p>They are to add three pairs of numbers to make the three biggest totals, and subtract three pairs of numbers to find the three smallest differences.</p> <div> <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none"> Decide whether to use a mental method or a written method to find the difference between two numbers; Use an extended vertical written method for subtraction. <p>(Refer to supplement of examples, section 6, page 50.)</p> </div>

Planning sheet	Day Five	Unit 3 <i>Written methods of addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Add or subtract any pair of two-digit numbers, including crossing the tens boundary. Framework p.46</p> <p>RESOURCES Resource sheet 3.3 Timer Whiteboards</p>	<ul style="list-style-type: none"> Use Resource sheet 3.3 from previous lesson. Time responses. Divide the class into pairs. Write 2 two-digit numbers on the board for children to add e.g. $46 + 23$ (without crossing 10s). Allow 15 seconds for children to write answers on whiteboards. Award 1 mark per correct answer. Repeat. Continue but only allow 10 seconds per question. Extend to crossing tens boundary e.g. $45 + 27$ $36 + 28$ Include subtraction without crossing tens boundary e.g. $96 - 24$ $37 - 16$ Then crossing tens boundary e.g. $92 - 25$ $62 - 27$ 	<p>Develop and refine written methods for subtraction, building on mental methods including money.</p> <p>VOCABULARY pound, pence subtraction addition cheaper total</p> <p>RESOURCES Resource sheet 3.4 Resource sheet 3.5</p>	<ul style="list-style-type: none"> Discuss the homework. Compare answers. Correct errors. Discuss with children decisions that would need to be made if they organised a trip for the class. The coach companies have sent their prices in for the weekend. Display the 'Find the best deal' (Resource sheet 3.4). <div>Q Which coach company offers the best deal?</div> <ul style="list-style-type: none"> In pairs children use 'find the best deal' information to answer the question. <p>Collect responses. Work through the first calculation with the class adding from left to right.</p> $\begin{array}{r} 625 \\ + 47 \\ \hline 600 \\ 60 \\ 12 \\ \hline 672 \end{array}$ <p>Establish that the answer is: Sunshine Coaches charge £672. Get children to check the other calculations using this method.</p> <ul style="list-style-type: none"> Explain that the school must pay a deposit. Ask: <div>Q If the deposit is £175 how much more would the school have to pay to each coach company?</div> <p>Collect answers and correct errors.</p>	<ul style="list-style-type: none"> Ask children who worked correctly to demonstrate their method for Green Coaches. Emphasise that the method of subtraction is called counting up and the best way is to make 10s and 100s. Demonstrate for Smart Coaches. $\begin{array}{r} 631 \\ - 175 \\ \hline 5 \text{ to make } 180 \\ 20 \text{ to make } 200 \\ 400 \text{ to make } 600 \\ 31 \text{ to make } 631 \\ \hline 456 \end{array}$ <p>The school would pay £456 more.</p> <ul style="list-style-type: none"> Explain that some calculations can be done mentally; others need to be written. Hold up cards with the following on: (Resource sheet 3.5) <div>Q Which would you do mentally?</div> $\begin{array}{l} 480 - 350 \\ 897 - 197 \\ 897 - 94 \\ 900 - 30 \\ 897 - 38 \\ 900 - 37 \\ 456 - 123 \\ 321 - 199 \end{array}$ <div>Q Which could be done easily in our heads? Why?</div> <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none"> Use method of subtraction to solve money problems (whole pounds) (counting up); Use method of addition to solve money problems (whole pounds) (most significant digit first). <p>(Refer to supplement of examples, section 6, pages 48 and 50.)</p>

Decade cards

10	20
30	40
50	60
70	80
90	100

Number grid

17	16	3	11	7	18
1	8	13	5	12	2
6	19	9	14	4	15

Subtraction 'follow me' cards

4	20 minus 0	2	Decrease 20 by 1	15	How many are left if 12 is taken from 20?	20	20 subtract 6
19	20 subtract 7	8	What is the difference between 20 and 14?	14	Decrease 20 by 5	13	How many are left if I take 2 from 20?
6	20 minus 13			18	20 subtract 8	7	What is the difference between 18 and 20?
1	20 subtract 17	12	How many are left if I take 3 from 20?			0	20 minus 4
17	20 minus 9	16	Decrease 20 by 15	11	20 subtract 10		
5	What is the difference between 20 and 16?	10	20 minus 11	3	20 less 20	9	20 minus 19

Find the best deal

Sunshine Coaches

Coach **£625**

Meals **£47**

Smart Coaches

Coach **£558**

Meals **£73**

Fast Coaches

Coach **£635**

Meals **£28**

Green Coaches

Coach **£544**

Meals **£37**

Subtracting mentally

$$480 - 350$$

$$897 - 197$$

$$897 - 94$$

$$900 - 30$$

$$897 - 38$$

$$900 - 37$$

$$456 - 123$$

$$321 - 199$$

457	194	63	436	218
586	123	72	186	351
97	27	205	278	48