Five daily lessons

National
Numeracy *Strategy*

Year 5
Autumn term

Unit Objectives
Year 5

• Find difference by counting up through next multiple of 10, 100 or 1000.	Page 41
• Partition into H, T and U adding the most significant digits first.	Page 41
• Use informal pencil and paper methods to support, record or explain additions and subtractions.	Pages 49, 51
• **Extend written methods to column addition/ subtraction of two integers less than 10 000.**	Pages 82-89
• **Use all four operations to solve simple word problems involving numbers and** quantities based on 'real-life' and money using one or more steps. **Explain methods and reasoning.**	Page 75
• Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, calculator.	Page 73
• Check with the inverse operation when using a calculator.	Pages 73, 75

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:

• Whiteboards or similar
• OHP calculator
• Calculators
• 10-sided dice or digit cards
• Bingo cards or 3x4 grids
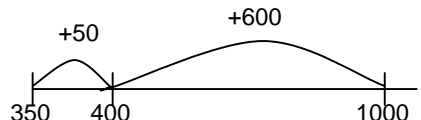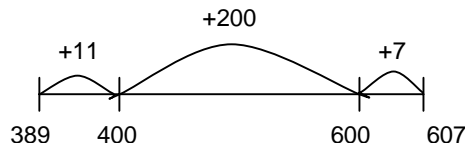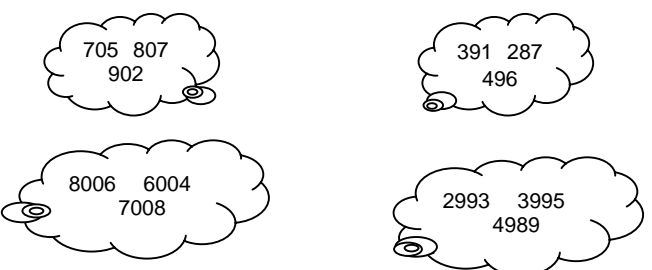• Proforma for word problems (see Day 5)

Link Objectives

Year 4

• Find a small difference by counting up (e.g. 5003 – 4996).
• Partition into tens and units, adding the tens first.
• Use informal pencil and paper methods to support record or explain additions and subtractions.
• **Develop and refine written methods for column addition and subtraction of two whole numbers less than 1000.**
• Check with the inverse operation.
• **Choose and use appropriate number operations and appropriate ways of calculating (mental, mental with jottings, pencil and paper) to solve problems.**
• Use all four operations to solve word problems involving numbers in 'real-life', money and measures (including time), using one or more steps, including converting pounds to pence and metres to centimetres and vice versa.
• Explain methods and reasoning about numbers orally and in writing.

(Key objectives in bold)

Year 6

• Consolidate all strategies from previous year including find a difference by counting up.
• Use informal pencil and paper methods to support, record or explain additions and subtractions.
• **Extend written methods to column addition and subtraction of numbers involving decimals.**
• Check with the inverse operation when using a calculator.
• Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, and calculator.
• **Identify and use appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities.   Explain methods and reasoning.**
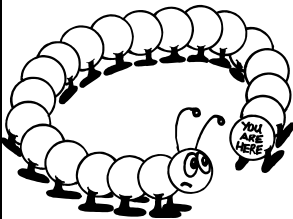
department for
education and skills

Planning sheet	**Day One**	**Unit 11** *Addition and subtraction*		**Term:** *Autumn*	**Year Group:** *5*
Oral and Mental		**Main Teaching**			**Plenary**
Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**		**Teaching Activities/ Focus Questions**

Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**	**Teaching Activities/ Focus Questions**
Derive quickly all two-digit pairs that total 100 and pairs of multiples of 50 that total 1000.	• Ask the children to show you two numbers which total 100 (use whiteboards). • With a partner, children to show 2 x two-digit numbers which total 100, where neither number is a multiple of 10. Discuss examples and record a few on the board. **Q** What is the sum of the units each time? (10) **Q** What is the sum of the tens? (90) • Ask for further pairs of numbers. • Ask a child to give a three-digit number which is a multiple of 50. • Children to calculate the complement to 1000 and show it on their whiteboards. **Q** Can you explain how you worked this out? • Repeat with other three-digit multiples of 50 and record the pairs on the board. Compare with the pairs which made 100. **Q** Which digits have a sum of 100? (tens) **Q** Which digits total 900? (hundreds)	Find the difference between two integers by counting up through 10, 100, 1000.	• Using an example from the mental/oral starter game; e.g. 350 + 650 = 1000 • Record counting on method using the empty number line. $$+50 \qquad +600$$ 350 400 1000 **Q** What are the four related number sentences for this calculation? 350 + 650 = 1000 650 + 350 = 1000 1000 − 350 = 650 1000 − 650 = 350 • Explain the connection between addition by counting on and subtraction by finding the difference. Model the following example. $$+200$$ $$+11 \qquad\qquad +7$$ 389 400 600 607 • Repeat with 2006 − 1994; 7005 − 3991. • Children to use whiteboards (individually or in pairs). Children record the steps on a number line as the teacher talks through the steps. Provide further examples for children to work out mentally (without a number line) and discus methods used. • Write a selection of four-digit numbers and another selection of three-digit numbers each in two clouds. Ask the children to find the difference between pairs of numbers in each pair of clouds by counting on e.g. 705 807 902 391 287 496 8006 6004 7008 2993 3995 4989	• Assess understanding by choosing children to demonstrate their calculations on the board. • Identify and correct errors and misconceptions. • Summarise and review the day's objectives. **By the end of the lesson, children should be able to:** • **Find the difference between two integers by counting up through 100 or 1000;** • **Derive rapidly all two-digit pairs that total 100 and pairs of multiples of 50 with a total of 1000.** (Refer to supplement of examples, section 6, page 41.)
VOCABULARY two-digit number total multiple		VOCABULARY counting on multiple difference integer subtract take away minus		
RESOURCES Whiteboards		RESOURCES Whiteboards		

Planning sheet	Day Two (page 1 of 2)	Unit 11 *Addition and subtraction*	Term: *Autumn*	Year Group: *5*
Oral and Mental		**Main Teaching**		**Plenary**

Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions

Read and write whole numbers and know what each digit represents.	• Say numbers less than 100 000 and ask individual children to write them in figures on the board or OHT.
	
	• Point to different digits in turn on one of the numbers.
	
	Q What does this digit represent?
	
	• Write 468 on the board, establish the value of each digit and record as:
	468 = 400 + 60 + 8
	Revise the term 'partition', then repeat with a four-digit then a five-digit number.
	
	• Using an OHP calculator, show how to play 'Space Invaders'.
	
	Enter a four-digit number on the calculator.
	
	These digits are 'aliens' which are to be shot down one at a time by subtracting to zero e.g. starting number 4671, press – 4000 to shoot down the 4, then – 600 to shoot down the 6, then – 70, then – 1 to leave 0 on the display.
	
	• Children play 'Space Invaders' in pairs, entering three-, four- or five-digit numbers.
		Partition into H, T and U, adding the most significant digit first.
		
		Use informal pencil and paper methods to support, record or explain additions.
		
		Extend written methods to column addition of two integers less than 10 000.
			Q How can we use partitioning to help us to calculate 54 + 28 mentally?
			
			• Discuss responses and record as 50 + 20 = 70, 4 + 8 = 12, 70 + 12 = 82. Explain that this demonstrates the mental process when partitioning is used to add numbers together.
			
			Q Can we calculate 354 + 28 in a similar way?
			
			• Discuss and record 350 + 20 = 370, 4 + 8 = 12, 370 + 12 = 382.
			
			• Provide a few examples, asking children to work out the answers mentally (without any recording).
			
			• Say a calculation such as 468 + 276.
			
			Q Is this easy to work out mentally?
			Q Why not?
			
			• Establish that it is difficult to remember the numbers as the calculation is performed. Explain that recording the addition in stages helps the memory, then record as shown in Fig.(i):
			
			   Fig. (i) Fig. (ii) Fig. (iii)
			
			                             468 468
			  468 + 276 + 276 + 276
			    400 + 200 = 600 600 14
			     60 + 70 = 130 130 130
			       8 + 6 = 14 14 600
			               744 744 744
			
			• Revise the informal written method and record alongside, as shown in Fig. (ii) above.
			
			• Ask children to try this method with 587 + 346, then model on the board.
			
			Q Would it affect the answer if we added the units first?
			
			• Discuss then record the first example as shown in Fig. (iii).
			
			• In pairs children generate 2 three-digit numbers using 10-sided dice or digit cards. They practise using the written method, one adding hundreds first, the other starting with units, then compare results.
				• Discuss children's results and ask one or two volunteers to demonstrate one of their 'carrying' sums on the board.
				
				Q How can we check that the answers are correct?
				
				• Demonstrate suggestions with the calculation 587 + 475 (used earlier to show the carrying method) such as: adding in a different order, e.g. 900 + 150 + 12 = 1062 and using the inverse operation to check the answer, e.g. 1062 – 600 = 462
				462 + 13 = 475.
				
				• Ask children to check one of their calculations.

VOCABULARY partition digit RESOURCES OHP calculator Calculators		VOCABULARY partition digit written method carrying RESOURCES 10-sided dice or digit cards		**By the end of the lesson, children should be able to:** • **Work out simple additions involving three-digit numbers mentally;** • **Use a written method for addition of pairs of three-digit numbers which are more difficult to calculate mentally;** • **Check results of addition calculations.** (Refer to supplement of examples, section 6, pages 41 and 49.)

(cont'd)

Planning sheet	Day Two (page 2 of 2)	Unit 11 *Addition and subtraction*		Term: *Autumn*	Year Group: *5*
Oral and Mental		**Main Teaching**			**Plenary**
Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**		**Teaching Activities/Focus Questions**
			• Silently demonstrate the following calculation (no verbal clues): 587 + 475 1062 11 **Q** Can you work out how I have calculated this? • Children discuss in pairs. Take feedback, then revise the carrying method with another pair of numbers. • Ask children to try using the carrying method to find the sum of two more pairs of numbers.		

Planning sheet	Day Three	Unit 11 *Addition and subtraction*		Term: *Autumn*	Year Group: *5*
Oral and Mental		**Main Teaching**			**Plenary**
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/ Focus Questions

Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
Round any integer up to 10 000 to the nearest 10, 100 or 1000.

VOCABULARY
round up/down
digit

RESOURCES
Whiteboards or Place value cards | • Revise the rounding rules, i.e. if the digit to the right of the tens, hundreds or thousands is less than 5, round down.

• If it is greater than 5, round up.

• Demonstrate by writing 7682 on the board or OHT.

• Ask children to round the number to the nearest 10, then 100 then 1000.

• Each time review why the digit is rounded up or down.

• Give a variety of numbers orally. Children use whiteboards or place value cards to show answers rounded to 10, 100 or 1000.

• Write 6400 on the board and ask children to show a number which would round to it.

• Repeat with 7530 and 3000. | Partition into H, T and U, subtracting the most significant digit first.

Use informal pencil and paper methods to support, record or explain subtractions.

Extend written methods to column subtraction of two integers less than 10 000.

Check with the inverse operation.

VOCABULARY
partition
subtract
column method
counting up | • Write the following on the board or OHT: 569 – 42, 327 – 34, 632 – 264 .

Q Which are easy to do mentally by partitioning the numbers?

• Ask children to try the first two subtractions then explain their methods. Demonstrate using an empty number line for the third example, i.e.

+36 ⌒ +300 ⌒ +32 ⌒
264   300   600   632

Establish that the total of the steps is the difference.
• Draw a vertical number line to show the same steps and model the vertical recording of the calculation alongside, i.e.

264
+36
300
+300
600
+32
632

632
– 264
  36   to make 300
 300   to make 600
  32   to make 632
 368

• Ask children to use the written column method with 726 – 348 and 823 – 487.

Q Can you think of any other ways of doing 823 – 487?

• Discuss suggestions and demonstrate the compensation method, i.e.
  823
– 487
  323   (823 – 500)
 +13   (500 – 487 = 13)
  336

(If any standard method was taught in Y4, such as decomposition, include that example.)

• Provide examples for children to practise using a written column method, (or ask them to generate pairs of three-digit numbers using dice or digit cards, then find their differences using any appropriate method).
• Discuss how answers can be checked and demonstrate the use of addition.
• Ask children to check their subtractions by adding the answer to the number subtracted. | • Use a subtraction equation such as 1782 – 493 = 1289.

• Create a word problem around the equation.

• Ask children in pairs to create another word problem using the same calculation.

• Take feedback, then repeat with an addition equation.

HOMEWORK
• Give children four complete equations, one addition, one subtraction, one multiplication and one division.
• Ask them to create a word problem for each.

By the end of the lesson, children should be able to:

• **Use partitioning to find differences between appropriate pairs of three-digit numbers, or a three- and two-digit number, mentally;**
• **Use a written column subtraction method with pairs of three-digit numbers;**
• **Check results using he inverse operation.**

(Refer to supplement of examples, section 6, pages 41, 51 and 73.) |

NNS Unit Plans

Planning sheet	Day Four	Unit 11 *Addition and subtraction*	Term: *Autumn*	Year Group: *5*

Oral and Mental		Main Teaching		Plenary

Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
Know by heart all multiplication facts up to 10 x 10. VOCABULARY multiplied by times product RESOURCES Bingo cards or 3x4 grids	• Ask 'quick fire' questions on multiplication facts up to 10 x 10. Focus particularly on x7 and x8 facts. Vary the vocabulary used. Q How can we use x4 to find x8? • Reinforce that doubling x4 is a useful strategy to use when x8 facts are not known. • Provide appropriate 'Bingo' cards, or ask children to choose 12 numbers from a selection on the board and write them on a 3x4 grid. • The numbers should be multiples of 6, 7 and 8, or other tables in which further practice is needed. • Use a 10-sided dice to generate questions involving x6, x7 and x8. • Children cover, or put a line across the products on their cards. • If appropriate, collect homework from Day 3. • Select two problems and copy onto acetate and enlarge to A3 for Day 5.	Choose and use appropriate number operations to solve problems. VOCABULARY operation multi-stop problem words in problems which indicate addition and subtraction e.g. more altogether and total left difference change	• Read out word problems. • Ask children to decide which operation they should use. Show on whiteboards. • Distribute sheets of mixed word problems. Ask pupils to record on the sheets those that use +/-. • Together, discuss responses. Q How do you know whether to +/–-/x/÷? Q What clues do you look for? • Discuss, then record lists of addition and subtraction vocabulary on the board or OHT. Q Which would you do mentally? Q Which with pencil and paper? • Children to choose appropriate strategy to solve the +/- problems. Remind them to check their answers. • Ask children to explain the methods/strategies they have used for the calculations. • Discus why particular methods were chosen. Q How did you check your answers? • Discuss the ways in which children have answered the problems, emphasising the need for sentences which reflect the questions.	• Reinforce the objective and purpose of lesson. • Give pupils the answer to a word problem, e.g. 26 clowns. • Pupils, in threes, to devise an oral problem that provides the answer (groups feedback to each other). • Teacher scribes the calculation. • Once initial responses in, request a similar question for 18 camels; this needs to be a multi-step question involving at least two types of operations. **By the end of the lesson, children should be able to:** • **Spot word problems that can be solved using +/–- from a set of word problems using all four operations;** • **Choose appropriate strategies to solve them;** • **Explain reasoning and method chosen using key vocabulary.** (Refer to supplement of examples, section 6, pages 83-85.)

Planning sheet	Day Five	Unit 11 *Addition and subtraction*	Term: *Autumn*	Year Group: *5*

Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**	**Teaching Activities/Focus Questions**
Solve mathematical problems or puzzles.	• Caterpillar Game • Teacher selects a four-digit number (kept secret). • Segmented caterpillar drawn on board with about 20 segments. • Pupils take turns to ask questions – yes/no. • Initially the question is noted on board by teacher. • Pupils need to ask relevant starter questions such as; Is it a four-digit number? Is it odd? • Once the answer to a question is no, a segment is wiped off. 	Explain methods and reasoning. Extend written methods to column and +/- of 2 integers less than 10 000. Check calculations using inverse operations. VOCABULARY single-step problem two/three-step problem RESOURCES Proforma for word problems. OHT acetate showing 2 problems produced by the children for homework set on Day 3.	• Having selected two examples from children's homework and transformed to OHT acetate, use for first part of lesson (select one single step and one multi-step problem) – one of + and one of – . Alternatively, provide two such word problems. • Focus on mathematical vocabulary used and highlight this. Discuss all known meanings and alternatives. • Focus on the calculation methods and strategies that are appropriate, modelling methods taught during this unit. • Introduce group work activity as follows: - Groups of three mixed-ability pupils to work collaboratively to produce word problems and illustrate how a pupil would arrive at an answer (refer to methods practised during this unit). - Give a proforma such as that shown below to each group. - Explain that a booklet will be produced and used in either a parallel class's lesson, a lower/higher class's lesson, or within your own class. • Completed examples could be word processed as part of an ICT lesson onto the template following the plenary. Problem Your working Alternative Answer (in a sentence)	• Choose an incomplete problem or a group having difficulty with some aspect of a problem and use as exemplar. • The group explain the stage of progress or where the difficulty arises. • Class give support in completing/solving the problem. **Q** Explain how you might tackle this question. **Q** Is there another way of tackling the question? **Q** Is one more efficient then another? Why? • Focus on the vocabulary and the methods used. • Ensure that the inverse check is applied. **By the end of the lesson, children should be able to:** • **Use an informal written method to +/- two integers less than 10,000;** • **Choose appropriate operation to solve multi-step word problems;** • **Check calculations using inverse method.** (Refer to supplement of examples, section 6, pages 49-51.)
VOCABULARY odd/even multiple of less/greater than between digit				

NNS Unit Plans