

Unit 7

Addition and subtraction

Five daily lessons

National
Numeracy Strategy

Year 6
Spring term

Unit Objectives Year 6

- Use known number facts and place value to consolidate mental addition/subtraction.
- **Extend written methods to column addition and subtraction of numbers involving decimals.**
- **Identify and use appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities.**
- **Explain methods and reasoning.**
- Develop calculator skills and use a calculator effectively.
- Check with the inverse operation when using a calculator.
- Check the sum of several numbers by adding in reverse order.
- Estimate by approximating then check result.

Pages 45, 47

Pages 49, 51

Pages 82-89

Pages 82-89

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Page 73

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 7.1
- Activity sheet 7.1
- OHT 7.1
- OHT 7.2
- OHT 7.3
- OHT 7.4
- OHT 7.5
- Whiteboards
- Set of large digit cards 0 to 9
- Timer
- OHP calculator
- Calculators
- Related Key Stage 2 national test questions

Year 5

Link Objectives

Year 7

- 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.**
- Develop calculator skills and use a calculator effectively.
- Check with the inverse operation when using a calculator.
- Use knowledge of sums and differences of odd/even numbers.

- Use standard column procedures to add and subtract whole numbers and decimals with up to two decimal places.
- **Check a result by considering whether it is of the right order of magnitude** and by working the problem backwards.
- Carry out calculations with more than one step using brackets and the memory; use the square root and sign change keys.

(Key objectives in bold)

department for
education and skills

5.4	3.3	8.8	6.7	4.5
2.6	4.9	7.2	8.9	9.4
1.7	9.5	3.9	2.1	7.8
1.3	6.6	4.4	5.2	1.8

1. Lucy's school bag weighed 5.75kg. She removed a text book weighing 0.87kg and her lunch box weighing 0.55kg. What does her bag weigh now?
2. Ben bought a CD for £13.75 and video for £17.99 with his birthday tokens. His birthday tokens were worth £40. How much did he have left to spend?
3. Adam's telephone bill for January was £37.56. February's bill was £12.48 less, but for March it had gone up more than January's by another £5.97. What was Adam's total bill for the three months?
4. Sally and Nareen each had £10. They went to the cinema. Their return bus journey cost them each £1.80 and their ticket to the cinema was £3.75 each. Sally bought a drink for £1.20 and a bag of popcorn for 75p. Nareen had an icecream for 90p. How much money did Sally and Nareen each have left?
5. Asif went to a Christmas sale. He bought four presents for £12.80. The full prices of the four presents before the sale were £6.99, £3.99, £5.99 and £2.99. How much money did he save?

796.95	796.93	796.077	796.082	796.99	796.51
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First Number	Second Number
Sum	Difference

30	40	
		50

12.35		
		11.12
14.81		

The **SUM** of:

- two or more **EVEN** numbers is _____
- an **EVEN** number of **ODD** numbers is _____
- an **ODD** number of **ODD** numbers is _____

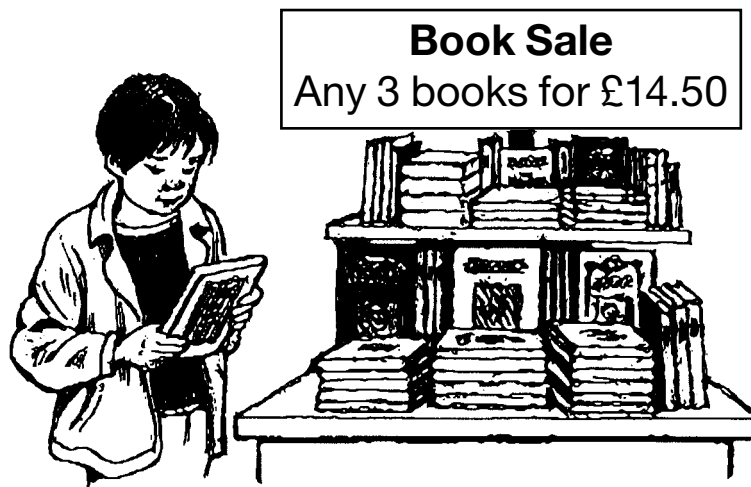
The **DIFFERENCE** between:

- two **EVEN** numbers is _____
- two **ODD** numbers is _____
- one **ODD** and one **EVEN** number is _____

Related Key Stage 2 National test questions:

2001 Test A

14



Lee bought these **three books** in the sale for **£14.50**.

How much money did he save altogether compared to the **full price** of the books?



Show
your **working**.
You may get
a mark.

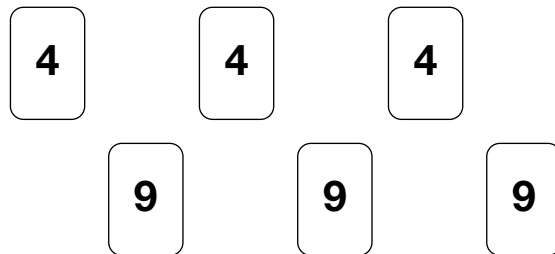


£

Total

6

Here are some number cards.



Use **five of the number cards** to make this correct.



$$\begin{array}{r}
 \boxed{} \boxed{} \boxed{} \\
 + \boxed{} \boxed{} \\
 \hline
 5 \quad 4 \quad 8 \\
 \hline
 \end{array}$$

6
2 marks

Total

Unit 7 Year 6 (Spring Term)

2000 Test A

21

Calculate $8.6 - 3.75$



21

1 mark

Total

Unit 7 Year 6 (Spring Term)

2000 Test B

4

Write in the missing number.



$$60 + 99 + \boxed{} = 340$$

4

1 mark

Total

2000 Test B

7

Write **two numbers**, each **greater than 100**, to complete this subtraction.



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−

--	--	--

=

2	0	8
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7

1 mark

Total

2001 Test B

27

p and **q** each stand for whole numbers.

$$p + q = 1000$$

p is 150 **greater** than **q**.

Calculate the numbers **p** and **q**.



Show
your **working**.
You may get
a mark.

p =

q =

27

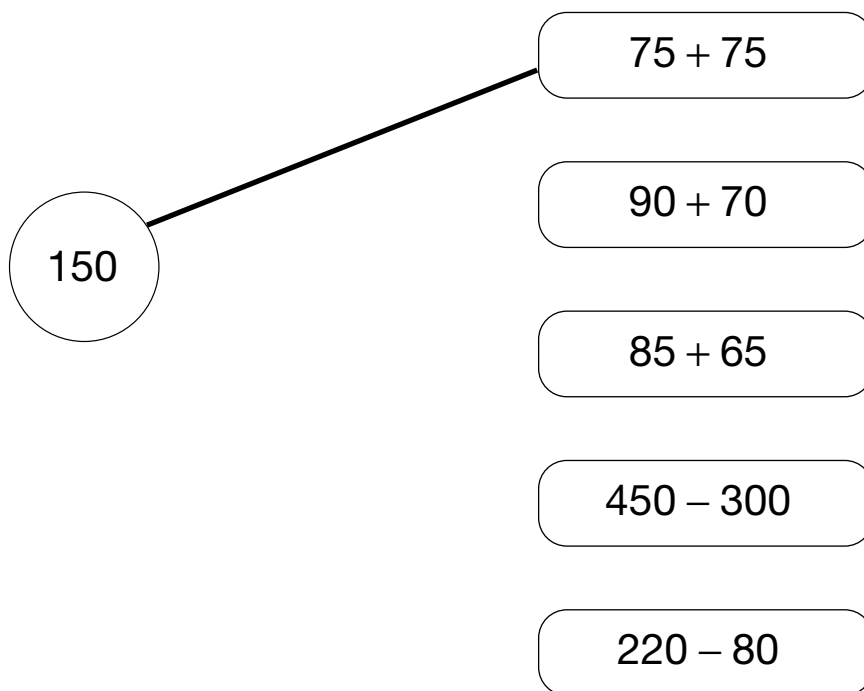
2 marks

Total

2002 Test A

1

Draw lines to join the circle to **two more** number cards which make **150**.



1
2 marks

12

Write in the missing digits.



$$\begin{array}{|c|c|c|} \hline 4 & & 4 \\ \hline \end{array} + \begin{array}{|c|c|c|} \hline 3 & 8 & \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline 8 & 5 & 1 \\ \hline \end{array}$$

12
1 mark

Total

Unit 7 Year 6 (Spring Term)

2002 Test A

16

Calculate $15.05 - 14.84$



16

1 mark

2002 Test B

20

Write in what the missing numbers could be.



170 +

= 220 -

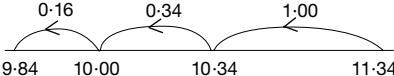
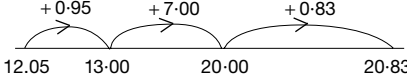
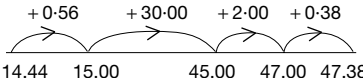
20

1 mark

2002 Mental Arithmetic

1	Add thirty-six and seventy.		36 70
7	What is the time twenty minutes after nine fifty-five?		9.55 20
8	Subtract one hundred and five from two hundred.		105 200
9	What is the sum of eight point five and eight point six?		8.5 8.6
16	Add together fifty-three, fifty-five and fifty-seven.		53 55 57
17	Jenny thought of a number. She doubled it and then added four. The answer was eighty-eight. which number did she think of?		

Total

Planning sheet	Day One	Unit 7 <i>Addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Give a decimal lying between two others.</p> <p>Know what each digit represents in a number with up to three decimal places.</p>	<ul style="list-style-type: none">Ask children whether anyone has heard of the Dewey Decimal Classification System. <p>Explain that, in the 1870s Melvil Dewey invented a system of classifying library books on different subjects to make them easy to find. Each code has a three-digit whole number followed by a decimal part. Books are stored in DDC numerical order, in libraries all over the world using the system.</p> <p>You can find science books in the range 500 – 599.999 and within that mathematics books are usually filed beginning 510. Sport books have numbers beginning 796.</p> <p>OHT 7.1 can be cut up into strips to imitate book spines with Dewey Decimal Classification System numbers on them. Put two of the strips on the OHP and invite children to arrange them in numerical order and place the other strips in the correct places. Ask questions such as:</p> <div><p>Q Is a number 796.93 bigger or smaller than 796.95? Why?</p><p>Q Can you suggest some numbers for books which lie between these two?</p><p>Q Can you think of a number for a book to be placed before 796.077?</p></div> <ul style="list-style-type: none">Use similar questions to help sort the other sets of classes. <p>(A helpful way to compare 796.082 and 796.51 is to write the latter as 796.510.)</p>	<p>Extend written methods to column addition and subtraction of numbers involving decimals.</p> <p>Q You want to buy something costing £33.79 but you only have £22.45. How much more money do you need?</p> <p>Ask the children to solve the problem. Discuss with them the methods they used.</p> <p>On the board work through the subtraction using a column method. Establish the answer is £11.34.</p> <p>Q If you were given £1.50 how much would you still need?</p> <p>Ask the children to work through the subtraction mentally, with jottings on their whiteboards. Collect responses and use the empty number line to illustrate the right to left approach:</p> <p></p> <p>Compare this method with the column method:</p> <p>$\begin{array}{r} 11.34 \\ - 1.50 \\ \hline 10.34 \text{ } (-1.00) \\ 10.00 \text{ } (-0.34) \\ \hline 9.84 \text{ } (-0.16) \end{array}$</p> <p>Emphasise the need to line up the decimal points.</p> <p>Work through other subtraction questions.</p> <ul style="list-style-type: none">Ask the children this question. <p>Q What two numbers can you find that have a difference of 2.5? Both numbers must be decimals.</p>	<p>Discuss strategies and calculations and ask:</p> <p>Q What numbers have a difference of 12.05?</p> <p>Collect answers and discuss methods.</p> <ul style="list-style-type: none">Pose the children the incomplete calculation: <p>$\begin{array}{r} 20.83 \\ - \quad . \\ \hline 12.05 \end{array}$</p> <p>Q What is the missing number?</p> <ul style="list-style-type: none">Model the counting-up process using the number line and show a corresponding written calculation, e.g. <p></p> <p>$\begin{array}{r} 20.83 \\ - \quad . \\ \hline 12.05 \end{array}$</p> <p>$\begin{array}{r} + 0.95 \\ + 7.00 \\ + 0.83 \\ \hline 8.78 \end{array}$</p> <p>Check that $20.83 - 8.78 = 12.05$</p> <p>Set similar questions involving numbers with one or two decimal places. Discuss the children's strategies and correct any misconceptions.</p>	<ul style="list-style-type: none">On the board write: <p>$\begin{array}{r} 400.1 \\ - 399.9 \\ \hline \end{array} \qquad \begin{array}{r} 47.38 \\ - 14.44 \\ \hline \end{array}$</p> <p>Q Which would you do in your head?</p> <p>Establish that the first calculation is quickly answered by counting up in your head.</p> <ul style="list-style-type: none">Explain how a number line can help to do the second calculation. Show an associated written calculation, e.g. <p></p> <p>$\begin{array}{r} 47.38 \\ - 14.44 \\ \hline 0.56 \text{ (15)} \\ 30.00 \text{ (45)} \\ 2.00 \text{ (47)} \\ 0.38 \text{ (47.38)} \\ \hline 32.94 \end{array}$</p> <p>Check by addition.</p> <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Use the chosen method to subtract two decimals with up to four digits and either one or two decimal places;Know that decimal points should line up under each other.<p>(Refer to supplement of examples, section 6, page 51.)</p></div>
RESOURCES Whiteboards Set of large digit cards 0 to 9 OHT 7.1		VOCABULARY difference decimal point		

RESOURCES
Whiteboards
Set of large digit cards 0 to 9
OHT 7.1

VOCABULARY
difference
decimal point

Planning sheet	Day Two	Unit 7 <i>Addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Know what each digit represents in a number with up to three decimal places.</p> <p>RESOURCES Whiteboards Timer</p>	<ul style="list-style-type: none"> Write 3·107 on the board. <div>Q What number is 7 hundredths bigger/smaller?</div> Children write their answers on their whiteboards and show. Correct any mistakes and misunderstandings. Repeat asking questions about units, tenths, hundredths and thousands. Use other starting numbers and set time challenges of 15, 10 and 5 seconds. 	<p>Extend written methods to column addition and subtraction involving decimals. Explain methods and reasoning.</p> <p>VOCABULARY digit decimal place</p> <p>RESOURCES Whiteboards</p>	<ul style="list-style-type: none"> Write on the board the digits 1, 2, 3, 4, 5, 6, 7, 8, 9. Explain that you are now going to invent a calculation using some of these digits. Write: $\begin{array}{r} 4\cdot36 \\ -1\cdot52 \\ \hline \end{array}$ <div>Q Which digits have I used? Which have I left out?</div> <p>Ask children to complete the calculation and hold up answer on their whiteboards. Establish the answer is 2.84 and check with an addition. Write the answer on the board and say that you are now going to invent another number using the three remaining digits 7, 8 and 9:</p> $\begin{array}{r} 4\cdot36 \\ -1\cdot52 \\ \hline 2\cdot84 \\ +9\cdot87 \\ \hline \end{array}$ <p>Ask children to add this to the previous answer. Establish the answer is 12.71.</p> Explain that the target number is 10. Children can use each digit from 1 to 9 only once. They form two three-digit numbers and subtract them. They then add a number using the three digits they have left to the answer from their subtraction. Each three-digit number must have two decimal places. With the class work through another example. $\begin{array}{r} 7\cdot93 \\ -2\cdot54 \\ \hline 5\cdot39 \end{array} \qquad \begin{array}{r} 5\cdot39 \\ + 6\cdot18 \\ \hline 11\cdot57 \end{array}$ <p>Agree that this is closer to the target number 10. Get children to try to get closer to the target number.</p> Collect children's answers and ask them to explain their strategies. <div>Q Can the target number be made?</div> <p>Collect children's reasons and explanations.</p> <p>Discuss what the combinations of numbers would have to be to ensure the answer was close to 10·00, when the addition was carried out.</p> 	<ul style="list-style-type: none"> On the board write the target number 50. Explain that the digits 1 to 9 are still being used but that this time there is to be one decimal place. The first two numbers are added together. Then the third number is subtracted from this total. Ask children to work through one example of their own. Ensure children understand the problem, work through an example if necessary. <p>HOMEWORK – Do five of your own calculations to try to make the target number 50.</p> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Use and develop an efficient standard method of addition and subtraction that can be applied generally. <p>(Refer to supplement of examples, section 6, page 51.)</p> </div>

Planning sheet	Day Three	Unit 7 <i>Addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Find doubles and halves of decimals (to one decimal place).</p> <p>RESOURCES Resource sheet 7.1 Whiteboards</p>	<ul style="list-style-type: none"> Display Resource sheet 7.1. Ask questions like: <div> <p>Q What number in the table when doubled gives a whole number answer? Is there more than one?</p> <p>Q What number in the table when halved gives an answer less than one? Is there more than one number?</p> </div> Can you find any numbers which, when halved, give an answer between 2 and 3? Can you tell if it will work before you do the calculation? Ask children to invent some similar questions using doubling and halving. Ask children to add pairs of numbers that give a whole number answer. <div> <p>Q What two numbers can you add to make a whole number total greater than 12?</p> </div> Collect answers and discuss the children's strategies. What two numbers can you subtract so their difference is five or more? What is the greatest difference? Collect answers and discuss the children's strategies. 	<p>Identify and use appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities.</p> <p>Use a calculator effectively and check results.</p> <p>VOCABULARY estimate</p> <p>RESOURCES OHP calculator Class set of calculators</p>	<ul style="list-style-type: none"> On the board write: <div> <p>Trainers – £37.99</p> <p>Shoes – £29.50</p> <p>T-Shirt – £12.25</p> <p>Jumper – £19.75</p> <p>Socks – £3.80</p> </div> <div> <p>Q Alice buys shoes and socks and pays with two £20 notes. How much change is given?</p> </div> Collect children's strategies. Confirm that the operations are addition and subtraction and work through them with the class. Ask other questions for children to answer that involve addition and subtraction calculations. Collect answers and correct any mistakes. Give out Activity sheet 7.1. Ask children to read the first question and say how they would solve it. Ask children to estimate the answer and discuss before giving out calculators. Work through the question with the class and emphasise how the children are to present their calculations. Ask them to answer questions 2 to 4, stressing the need to make estimates and possibly jottings before using their calculators. Collect solutions and discuss strategies. Correct any mistakes and misunderstandings. 	<ul style="list-style-type: none"> Ask the children to read through question 5 on the Activity sheet. <div> <p>Q How can you check if your answer is correct?</p> </div> Discuss the children's suggestions. Encourage them to round the four amounts up to the nearest pound and add their answers to get £20, then subtract £13 to get £7. <div> <p>Q Is the answer more or less than £7?</p> </div> Get the children to discuss their reasons why the answer must be more than £7. Emphasise the importance of checking answers. <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Solve problems involving money, etc. choosing the appropriate operation. Explain and record how the problem was solved. <p>(Refer to supplement of examples, section 6, page 85.)</p> </div>

Planning sheet	Day Four	Unit 7 <i>Addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
Use known number facts and place value to add and subtract mentally.	<ul style="list-style-type: none">Write the following questions on the board. Ask the children to calculate the answers mentally and write them on whiteboards. After each question ask children to explain their methods.<div>43 + 19 = 190 + 430 = 1·9 + 4·3 = 0·19 + 0·43 = 1900 + 4300 = 530 + 198 = 538 + 192 = 76 – 29 = 760 – 290 = 7·6 – 2·9 = 0·76 – 0·29 = 768 – 292 = 762 – 298 = 7600 – 2900 =</div>Ensure the pupils notice the connections between the examples.Choose further examples that build on knowledge of place value and number facts. <div>Q What strategies did you use to help you get the answer?</div>	Use knowledge of sums, differences and inverse operations to solve problems. Use appropriate operations to solve problems. 		

Planning sheet	Day Five	Unit 7 <i>Addition and subtraction</i>	Term: <i>Spring</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
Use known number facts and place value to consolidate mental addition and subtraction.	<ul style="list-style-type: none">On the board write: $14 + 7 = 21$ Collect the three associated statements: $7 + 14 = 21$, $21 - 7 = 14$, $21 - 14 = 7$ Ask children to write on their whiteboards two addition facts they can deduce from the first statement. Collect results and highlight any interesting examples. Repeat with each of the other three statements.	Use a calculator effectively. Check results with the inverse operation. Check the sum of several numbers by adding in reverse order. Estimate by approximating then check result. Confirm knowledge of sums and differences of odd and even numbers.	<ul style="list-style-type: none">Discuss the homework.	<ul style="list-style-type: none">Collect answers and correct any mistakes. Ask for children's methods.
	<div>Q If you know $14 + 7 = 21$ how can you find the answer to: $1400 + 700$? $1.4 + 0.7$?</div> <div>Q How does knowing $14 + 7 = 21$ help you to calculate $140 + 70$, $0.14 + 0.07$?</div> <p>Discuss children's strategies and pose related questions. Repeat using another starting statement e.g. $11 - 8 = 3$.</p>		<div>Q What strategies did you use?</div> <p>Demonstrate how taking the difference from the sum and then halving the number left is a useful strategy which develops yesterday's lesson:</p> $N1 + N2 = \text{Sum}$ $N1 - N2 = \text{Difference}$ <p>The sum is first number plus second number. The difference is first number minus second number. When the difference is subtracted from the sum, the first numbers cancel out and 2 second numbers are left. So, you can find the value of the second number by halving.</p> <ul style="list-style-type: none">Show OHT 7.3. Explain that the sides of the square must sum to 80. Ask children to work in pairs and complete the grid. Collect children's answers and discuss their methods. <div>Q Could one of the squares have zero in it?</div> <p>Agree that there is only one answer for some squares but many possible answers for others.</p> <ul style="list-style-type: none">Show OHT 7.4. Explain that this time any three numbers in a vertical, horizontal or diagonal line must total 48-12. Using calculators ask children to complete the square. <div>Q Is there more than one answer for any of the squares?</div> <p>Collect answers and discuss strategies. Establish that the answer for each square is unique.</p>	
RESOURCES Whiteboards		RESOURCES OHP calculator Calculators OHT 7.3 OHT 7.4 OHT 7.5		