N1.2 Adding and subtracting whole numbers

objectives

- Know addition and subtraction facts to 20.
- Know what each digit of a whole number represents.
- Add and subtract mentally pairs of two-digit numbers.
- Use jottings to support or explain mental calculations.
- Add whole numbers using a standard column method.

starter

Vocabulary
add
subtract
plus
minus
sum
difference
total
altogether
how many more?
how many less?

Resources
OHT N1.2a

Ask four or five quick-fire questions about complements in 10, such as:

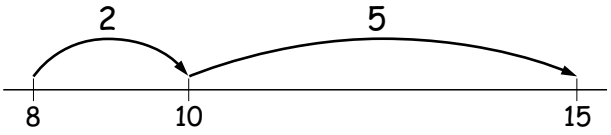
Q What must be added to 4 to make 10?
Q What is 2 plus 8? 10 minus 3?
Q Subtract 5 from 10.
Q How many more is 10 than 1?

Vary the vocabulary as much as possible.

Write 8 + 7 on the board.

Q Imagine that you have a friend who has forgotten the answer to this sum. How could your friend work out the answer?

Acknowledge pupils' suggestions, which may include that 8 + 7 is double 8 minus 1, or double 7 plus 1, or other strategies. Draw out that, if all else fails, the answer can be worked out in two steps by bridging through 10. First work out how much of the 7 must be added to the 8 to make 10, then add on the remaining amount. Illustrate with an empty number line.



Q How could you work out the answer to 6 + 9 if you had forgotten it?

Explain that, when adding, it is usually easier to put the larger number first. Write 9 + 6 on the board. Invite a pupil to the board to explain how to work out the answer by bridging through 10. Repeat with 6 + 7.

Write 16 – 7 on the board. Explain that with subtraction we can count up from the smaller number to the larger number, again by bridging through 10.

Now ask pupils to work out the answer to 8 + 5, this time by imagining the number line. Repeat with 7 + 9, 12 – 5 and 15 – 8.

Stress that there are other ways to work out addition and subtraction facts. For example, 16 – 7 might be done as 16 – 6 – 1, and 9 + 6 as 10 + 6 – 1. It doesn't matter which method is used but is important to be able to work out the answers quickly. Show the addition table on **OHT N1.2a**. Fill in the 'doubles' across the diagonal, asking pupils to call them out for you. Invite pupils to fill in some of the other facts, making sure that they recognise that they can fill in 8 + 6 at the same time as they fill in 6 + 8.

main activity

Vocabulary
addition
subtraction

Resources
OHT N1.2b
mini-whiteboards
ITP *Number line* (optional)

Write 80 on the board. Count on in tens around the class to 230. Then begin at 1000, and count back in tens to 880. Ask:

Q What is thirty plus fifty? Ninety take away forty? How did you know the answer?

Q Add seven hundred to two hundred. How did you work it out? Subtract five hundred from eight hundred. Explain how you did it.

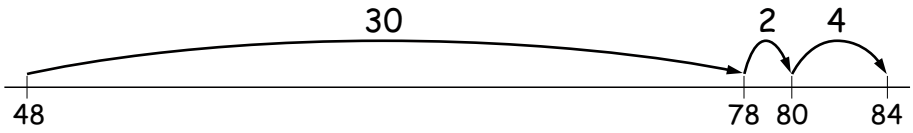
Extend to 56 + 30, 93 – 50. Refer to the 100-square on **OHT N1.2b** to confirm answers, counting on or back in tens. Model the calculation on an empty number line.

Write 357 on the board.

Q What do we add to change 357 into 397? To change 357 into 407?

Q What answer will we get if we take away 50 from 357? If we take away 60? How did you work it out?

Write 36 + 48 on the board. Ask pupils to do the calculation mentally and to explain their method. Show them that, if necessary, they can use an empty number line as a jotting to support their thinking. Say that they can also use empty number lines to explain their working in tests.



Repeat with 82 – 27, counting up from 27 to 77, to 80, to 82 (or other methods that pupils are confident with). Give some more examples.

You could, if you wish, provide extra support for this activity by using the ITP *Number line*, downloaded from www.standards.dfes.gov.uk/numeracy. Select options and ask questions to consolidate pupils' understanding.

Say that some calculations are too awkward to be done mentally. Write 369 + 138 on the board. Ask:

Q What will the answer be, approximately?

Establish that 369 can be rounded up to 400, and 138 can be rounded to 140. An approximate answer to the calculation is 400 + 140 = 540.

Invite pupils to come to the board to do a column addition. They may use an expanded form, adding either the hundreds or the ones or units first. Stress the importance of lining up the columns to help avoid errors.

```
  369
+ 138
  400
   90
   17
  507
```

Pupils will probably have moved beyond this stage, and will be carrying out column addition in a contracted form, with carrying figures below the total. If they make persistent errors with this method, revert to the expanded form above, asking them to explain the steps in their calculations.

other tasks

Springboard 7
Units 1 and 2

Unit 1 section 3: Mental addition

Unit 1 section 4: Mental subtraction

Unit 2 section 4: Addition

plenary

Resources
OHT N1.2c
mini-whiteboards

Show **OHT N1.2c**, a table showing the numbers of goals scored for and against some top teams in the 2001–02 football season. Pose the problem:

Q Some fans went to all of Liverpool's matches. What was the total number of goals they saw?

Establish that the key word is 'total' and the calculation is addition.

Q What other questions could you ask that involve addition?
Q What questions can you ask that involve subtraction?

Give each pair of pupils two of the words or phrases on the list at the bottom of the slide. Ask them to make up questions using the words and the information in the table. They should record the questions on their whiteboards.

Take feedback on at least one question for each key phrase. Ask pupils to calculate the answers, mentally if possible. Check and correct any errors.

Remember

- When 10 is added to a number, the digit in the tens place changes.
- It can help to bridge through 10 when adding pairs of single-digit numbers.
- When adding numbers mentally, it is usually easier to start with the larger number.
- An empty number line can be used to support mental calculations or to explain working, **including in tests**.

N1.3 Subtracting whole numbers

objectives

- Read and write whole numbers in figures and words; know what each digit represents.
- Subtract whole numbers using a standard column method.
- Calculate mentally a difference such as 8006 – 2993.
- Use jottings to support or explain mental calculations.

starter

Vocabulary
digit
value
write in figures
add
subtract
plus
minus
difference
what must be added to?

Resources
mini-whiteboards

Write 7041 on the board. Ask the class to read the number aloud in words. Discuss the value of different digits.

Q What is the value of the digit 7? Of the 4?
Q Why is there a zero or nought in the hundreds column?

Explain that the words 'zero' and 'nought' are used interchangeably, and that the zero is used as a place holder.

Q What number is 100 more than 7041? 100 less than 7041?

Talk through writing 4357 in an expanded form.

4357 = 4000 + 300 + 50 + 7

Ask pupils to write these numbers in figures on their whiteboards: four thousand two hundred; five thousand and ninety; two thousand and seven.

Check and correct any errors by writing numbers in an expanded form.

Write 97 on the board. Ask pupils to add 10 and write the answer on their whiteboards. Count on in tens round the class from 107 to 227.

Write 1012 on the board. Ask pupils to subtract 10 and write the answer (1002). Ask them to subtract 10 again and write the answer (992).

Begin at 6520, and count back in hundreds to 6120. Ask a pupil to write six thousand one hundred and twenty in figures on the board. Ask the class to subtract 100 and to write the answer on their whiteboards. Check the answers, write 6020 on the board, and ask the class again to subtract 100. Check the answers again. If necessary, use a number line to confirm.

main activity

Vocabulary
multiple

Resources
mini-whiteboards
OHT N1.2b
two card strips to cover multiples on OHT

Show **OHT N1.2b**, from lesson N1.2, using the card strips to cover up the multiples of 5 and the multiples of 10. Ask:

Q What are the missing numbers? Explain how you know.

Revise addition and subtraction facts to 20 by asking questions such as:

Q Seven add nine.
Q Subtract 6 from 14.

Remind pupils that it is usually easier to put the larger number first when adding. Remind them also that they can imagine bridging through 10 if they don't know the fact immediately. Encourage pupils to think quickly.

Ask pupils to use their whiteboards to answer questions such as:

76 + 8 = 84 65 – 7 = 58

Prompt by referring to OHT N1.2b (with the card strips removed) and asking:

Q What is the next multiple of 10 after 76? (80)
Q What must be added to 76 to make 80?

Each time, ask pupils to explain how they worked out the calculation.

Ask pupils to think about the mental methods of subtraction that they have used previously. Ask them to work out in their heads examples such as:

56 – 42 96 – 66 76 – 59 267 – 259

They can make jottings, or sketch a number line. Prompt by saying:

Q Imagine a number line. What multiples of 10 can you see on it? What other numbers can you see?

Q What is the answer? How did you work it out?

Explain that some calculations are too awkward to be done mentally. Write on the board:

```
  784
– 159
```

Ask:

Q What will the answer be, approximately?

Establish that 784 can be rounded up to 800, and 159 can be rounded to 150. An approximate answer to the calculation is 800 – 150 = 650.

Invite pupils to come to the board to tackle the subtraction. They may already use a method accurately and reasonably quickly. If there is no clearly established approach, you could introduce complementary addition, which relates closely to the counting-up method on the number line.

```
  784
– 159
    1      to make 160
   40      to make 200
  500      to make 700
   84      to make 784
  625
```

Pupils may be able to shorten this to:

```
  784
– 159
   41      to make 200
  584      to make 784
  625
```

If pupils have made sound progress with mental methods of subtraction, and are confident with addition and subtraction facts to 20, introduce them to a standard written method such as decomposition, first in an expanded form.

$$\begin{array}{rcrcrl} 784 & = & 700 + 80 + 4 & = & 700 + 70 + 14 & \\ \underline{-\ 159} & & \underline{-\ 100 + 50 + 9} & & \underline{-\ 100 + 50 + \ 9} & \\ & & & & 600 + 20 + \ 5 & = \ 625 \end{array}$$

With either method, draw attention to the hundreds, tens and units columns and the need to keep digits in their correct columns. With decomposition, stress that the calculation begins with the ones or units column on the right. To begin with, restrict 'exchanging' or 'borrowing' to the tens and units.

Demonstrate two more examples, then ask pupils to try for themselves.

other tasks

Springboard 7
Units 1 and 2

Unit 1 section 4: Mental subtraction

Unit 2 section 1: Putting numbers into words

Unit 2 section 5: Subtraction

Unit 2 section 7: Addition and subtraction problems

plenary

Write a set of subtractions on the board, or prepare an OHT. For example:

155 – 19 311 – 86 593 – 308 400 – 389 456 – 293 7000 – 6998

Discuss which of these questions can be done entirely mentally, which can be done mentally with some jottings, and which might need a written method in columns. Work through each calculation, inviting a pupil to explain their method to the class. Stress that the last example, in particular, is one that can be done mentally. Demonstrate on the number line one or two further examples such as 8006 – 2993.

Remember

- Look at the numbers carefully before deciding which way to do a subtraction.

OHT N1.2a

+	5	6	7	8	9
5					
6					
7					
8					
9					

OHT N1.2b

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

OHT N1.2c

This table shows the numbers of goals scored for and against some teams in the 2001–02 football season.

Team	Goals for	Goals against
Arsenal	79	36
Charlton Athletic	38	49
Chelsea	66	38
Leeds United	53	37
Leicester City	30	64
Liverpool	67	30
Manchester United	87	45
Newcastle United	74	52
Sunderland	29	51
Tottenham Hotspur	49	53
West Ham United	48	57

Make up questions about the teams. Use these words.

total **altogether** **add** **sum**

how many less? **take away** **minus**

difference **plus** **subtract** **how many more?**