N3.4 Adding and subtracting decimals

objectives

- Add and subtract mentally pairs of two-digit numbers, including decimals.

- Understand decimal notation and place value.

- Add and subtract decimals using written methods.

starter

Vocabulary

add
plus
subtract
minus
what do I need to add to?
what do I need to subtract from?

Resources

mini-whiteboards

Start with some quick-response questions. Write 8 on the board.

Q   Can you tell me a pair of whole numbers with a total of 8? And another pair? And another?

**Q   What is 8 minus 0.4?**

Remind pupils that there are ten tenths between 7 and 8 and that taking away four tenths will leave six tenths. Repeat with several similar questions, starting with a whole number and subtracting a number of tenths.

Show pupils how to add and subtract two-digit decimals in their heads by sketching a number line. Remind them that this is a 'jotting' and that it can be used in mental tests and in written tests. The diagram can be a useful way to show their working. For example:
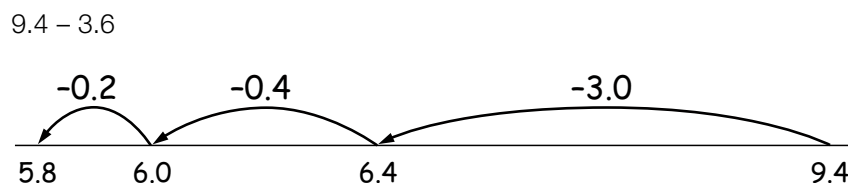
5.7 + 0.4
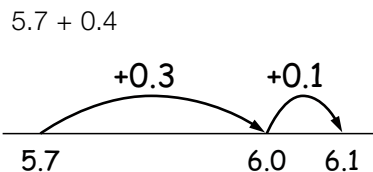
Start at 5.7. Ask yourself: 'What do I need to make the next whole number?' This is 0.3. Split the 0.4 into 0.3 and 0.1. Jump on 0.3 to reach 6, and then add on the remaining 0.1 to reach 6.1.

Show how to modify this for 5.7 + 3.4 by adding the whole number 3 first.

5.7 + 3.4
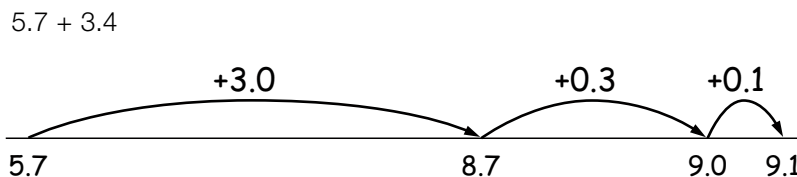
Repeat with subtraction.

9.4 – 3.6

Start at 9.4. Jump back the whole number 3 to reach 6.4. Ask yourself: 'What do I need to get to the next whole number?' This is 0.4. Split the 0.6 into 0.4 and 0.2. Jump back 0.4 to reach 6, and then the remaining 0.2 to reach 5.8.

Remind the class that there are sometimes quicker ways to do these things. For example, to add 2.9, it could be easier to add 3, then subtract 0.1. To subtract 2.9, it could be easier to subtract 3, then add 0.1.

$4.6 + 2.9$

$$\underset{4.6 \qquad\qquad 7.5 \quad 7.6}{\overset{+3.0 \qquad -0.1}{\frown}}$$
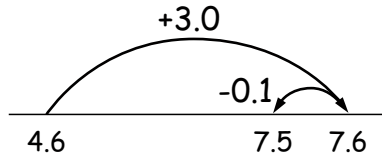
Now ask the class some mental addition and subtraction questions. Ask pupils to respond using their whiteboards. Check each answer as you go along, using an empty number line to correct errors.

Q What is nought point four plus nought point seven?

Q Add one point five to two point eight.

Q What is four point one minus nought point five?

Q Subtract six point seven from eight point four.

Q What must I add to four point six to make six point one?

Q What must I take from three point three to make nought point nine?

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main activity

Vocabulary
total
difference

Say that it is sometimes necessary to add or subtract decimals using a written method setting out the numbers in columns: for example, when the calculation is too difficult to do in your head and a calculator is not available. Remind the class that the same principles apply to decimals as they do to whole numbers.

- If the numbers involve different units of measurement (e.g. £ and p, cm and m), they must be changed to the same unit.

- The numbers must be written in columns with the decimal points underneath each other, the tenths under the tenths and the hundredths under the hundredths.

Write on the board £3.65, 80p and £2.49. Say that these are the cost of three items for a take-away meal: a pizza, a drink and a salad. You want to know the total cost of the items. Set out the three items in columns, first changing the 80p to pounds.

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3.65
0.80
2.49
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Find the total, using your preferred method, paying attention to the 'carry' figures and where to write them. For example, you might say:

First add the hundredths: five hundredths and nine hundredths make fourteen hundredths, that's one tenth and four hundredths. Next add six tenths, eight tenths and four tenths, plus the extra one tenth, that's nineteen tenths, or one whole and nine tenths. Three and two make five, plus the extra one, make six altogether.

Repeat with numbers with a different number of decimal places, such as 18.7 and 5.63.

Now discuss a subtraction problem.

> *There are two snakes at the pet shop.*
> *One is 84 cm long and the other is 2.32 metres long.*
> *What is the difference in the lengths of the snakes?*

Model a subtraction on the board in a similar way, using your preferred method. Stress the importance of both measurements being in the same units. Either change the 84 cm to 0.84 m, or change 2.32 metres to 232 centimetres, before carrying out the calculation.

other tasks	**Unit 6 section 3: Addition**

Springboard 7
Units 6 and 11

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plenary

Resources
Resource N3.4a

Write on the board three calculations typical of those discussed in the lesson. For each calculation, ask:

Q Would you do that calculation mentally, in columns with pencil and paper, or with a calculator? Why?

Q How could you work it out?

Q Could you do it a different way?

Q How could you check your answer?

Check for errors or misconceptions and discuss how to rectify them.

Finish with a selection of mental arithmetic questions taken from National Curriculum tests, using **Resource N3.4a**.

> **Remember**
>
> - Look at the numbers carefully before deciding how to do a subtraction calculation.
> - In word problems, make sure that measurements are in the same units before carrying out the calculation.

1 Multiply five by five, then add four.

2 How many degrees are there in two right angles?

3 What is the cost of four birthday cards at one pound and five pence each?

4 What is seven hundred and fifty-eight to the nearest ten?

5 The temperature in London was minus three degrees Celsius.
   The temperature in Barcelona was twenty degrees warmer.
   What was the temperature in Barcelona?

6 What is fifty-six divided by seven?

7 A jacket costs fifty-two pounds.
   In a sale the price is nineteen pounds less.
   What is the sale price?

8 Write eight tenths as a decimal number.

9 What is fifty-eight multiplied by ten?

10 Write nought point three as a fraction.

11 What is three quarters of sixty pounds?

12 Write another fraction that is equivalent to one fifth.

13 Add three point five to four point eight.

14 What is double fifteen point five?

15 A tape costs three pounds ninety-nine pence.
   How much would five of these tapes cost?