N1.5 Multiplying and dividing by 10 and 100

objectives

- Know addition and subtraction facts to 20.
- Recall multiplication facts to 10 × 10 and derive associated division facts.
- Multiply and divide whole numbers by 10 and 100 (whole-number answers), and explain the effect.
- Use a calculator effectively; enter numbers and interpret the display in different contexts.

starter

Vocabulary
subtract
minus
take away

Resources
mini-whiteboards
100-square or
OHT N1.2b

Start by asking pupils for pairs of numbers with a total of 10. Then ask a series of questions for pupils to answer on their whiteboards. Keep the units digit the same, and vary the wording.

Q **What is ten take away six? Twenty take away six? Ninety take away six? Fifty take away six?**

Q **What is thirty minus sixteen? What is seventy minus sixteen? How did you work that out?**

Q **Subtract twenty-six from fifty. Subtract twenty-six from eighty. How did you work that out?**

Q **What do you notice about the answers to all these questions?** (the units digit is always four) **Why?** (because ten take away six is four)

If pupils have difficulty with the questions, refer to a 100-square, for example, on **OHT N1.2b**. Remind them that subtract and minus mean the same as 'take away'.

Repeat with a different units digit.

Q **What is ten minus three? Forty minus three? Eighty minus three?**

main activity

Vocabulary
multiply
divide
ten times larger
ten times smaller
inverse
convert

Resources
OHT N1.5a
OHP calculator

As a class, chant the ten times table, forwards and backwards (one ten is ten, two tens are twenty, three tens are thirty, and so on). Write on the board:

$6 \times 10 = 60$

Explain that each individual unit in the six ones has been multiplied by 10, or made 10 times larger, so each one becomes ten. Use the place value grid on **OHT N1.5a** to show how the six ones or units have become six tens, and the digit 6 has moved one place to the left.

Now write on the board:

$40 \times 10 = 400$

Explain that this time each individual ten has been multiplied by 10, or made ten times larger. Demonstrate, using the place value grid, how the four tens have become four hundreds, and the digit 4 has moved one place to the left.

Write on the board: 46×10. Ask:

Q **What do you think the answer will be? How did you work it out?**

Establish that each of the digits has moved one place to the left and that 0 has been put in the units place as a place holder. Explain that 'add a 0' is not acceptable (it does not work with decimals). Repeat for one or two more two-digit numbers.

Use the OHP calculator, and multiply whole numbers under 100 by 10. Each time ask the class to predict the answer before you display it. Ask:

Q What will happen if I now divide the answer by 10?

Establish the generalisation that dividing by 10 makes the number ten times smaller and that each of its digits moves one place to the right.

Draw out, through a few different examples, that multiplying by 10 and dividing by 10 are inverse operations (one undoes the effect of the other).

As a class, chant the 100 times table. Write on the board:

$61 \times 100 = 6100$

Read the equation aloud together. Explain that each individual unit has been multiplied by 100, or made 100 times larger. Demonstrate on the board using thousands, hundreds, tens and units boxes, how each has moved two places to the left, or use **OHT N1.5a**.

Write on the board: 205×100. Ask:

Q What do you think the answer will be? How did you work it out?

Establish again that each digit has moved two places to the left. Repeat for one or two more two- or three-digit numbers.

Use the OHP calculator, and multiply numbers under 100 by 100. Each time ask the class to predict the answer. Ask:

Q What will happen if I now divide the answer by 100?

Establish the generalisation that dividing by 100 makes the number one hundred times smaller and that each digit has moved two places to the right.

Draw out, through more examples, that dividing by 100 and multiplying by 100 are inverse operations.

Remind the class that there are 10 millimetres in 1 centimetre. To change or convert centimetres to millimetres they must multiply by 10, and to change millimetres to centimetres they must divide by 10. Ask:

Q How many millimetres are there in nine centimetres?
Q Change one hundred and ninety millimetres into centimetres.

To change metres to centimetres, they must multiply by 100, and to change centimetres to metres they must divide by 100. Ask:

Q A table is two hundred centimetres long. How many metres is that?
Q Change nine hundred centimetres into metres.

other tasks

Springboard 7
Units 2 and 6

Unit 2 section 2: Multiplying and dividing by 10 and 100

Unit 6 section 5: Multiplication

plenary

Write on the board:

6×10 = 10 lots of 6 6×9 = 9 lots of 6

Q How can we work out nine times a number from ten times the number?
(subtract the number from ten times the number)

Demonstrate how to work out 6×9 as:

$(6 \times 10) - 6 = 60 - 6 = 54$

Then demonstrate how to work out 16×9 as:

$(16 \times 10) - 16 = 160 - 16 = 144$

Use this principle to complete the nine times table, writing it on the board. Ask:

Q What do you notice about the digits of the multiples of nine in the table?
(they always add to nine)

Chant the table forwards and backwards (one nine is nine, two nines are eighteen, three nines are twenty-seven, and so on). Finally ask:

Q How can we work out 99 times a number from 100 times the number?
(subtract the number from 100 times the number)

Practise one or two examples.

Remember

- Multiplying a number by 10 makes it ten times larger; the digits move one place to the left. Dividing a number by 10 makes it ten times smaller; the digits move one place to the right.
- Multiplying a number by 100 makes it one hundred times larger; the digits move two places to the left. Dividing a number by 100 makes it one hundred times smaller; the digits move two places to the right.
- To multiply a number by 9, multiply the number by 10 and subtract the number.

OHT N1.5a

thousands	hundreds	tens	units