Can I extend my written methods for multiplying whole numbers to multiplying decimals by whole numbers?

Teaching guidance

Key vocabulary

place value, digit, column, decimal point, tenth, hundredth, thousandth, partition, integer, method, strategy

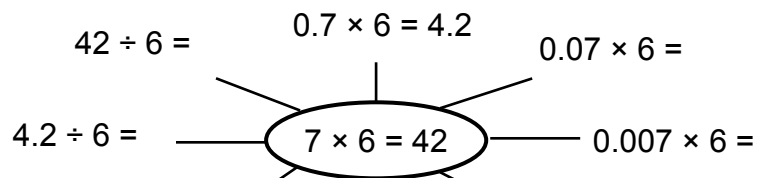### Models, images and resources

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Place-value cards

0 . 3   0 . 05

Use place-value cards to model how to partition decimal numbers before multiplying each part and then recombining to get the final product.

Grid method or Multiplication grid ITP

Even where children are working with a compact written method for multiplication, it is sensible when first multiplying decimals to go back to an expanded form such as the grid method, to help them focus on the value of each digit in the calculation.

x	2	0.7	0.05
6	12	4.2	0.3

$$
\begin{array}{r}
12 \\
4.2 \\
+ \quad 0.3 \\
\hline
=
\end{array}
$$

Spider diagrams

$42 \div 6 =$ $0.7 \times 6 = 4.2$ $0.07 \times 6 =$

$4.2 \div 6 =$ ($7 \times 6 = 42$) $0.007 \times 6 =$

To be successful at multiplying decimal numbers using a written method, children need to be completely secure in using known multiplication facts to derive linked decimal facts. Spider diagrams provide a visual way of recording these facts.

Teaching tips

- Ensure that children know the value of each digit in decimal numbers and can state them as decimals and fractions, for example, the value of the six in 3.69 is 0.6 or 6/10.

- Help children to secure their understanding of place value in decimals. Use resources such as base ten apparatus or money to represent wholes, tenths and hundredths to provide them with a visual image. They need to know that ten thousandths = one hundredth, ten hundredths = one tenth and ten tenths = one whole. Teach them to use this understanding to appreciate that, for example, $0.06 \times 4 = 24$ hundredths = two tenths + four hundredths, and so is written as 0.24.

- Give children regular practice in using known multiplication facts to derive linked decimal facts. For example, children should be able to use $6 \times 8 = 48$ to derive:

    $0.6 \times 8 = 4.8$ $0.06 \times 8 = 0.48$ $0.006 \times 8 = 0.048$ $0.6 \times 0.8 = 0.48$, and so on.

- Make sure that children can explain each step of their whole-number written method for multiplication before extending this into working with decimals. They should use the value of the digit they are working with as part of their explanation, for example, by saying two tens or 20 rather than just two.

- Compact methods for multiplication are efficient but often do not make the value of each digit explicit. When introducing multiplication of decimals, it is sensible to take children back to an expanded form such as the grid method where the value of each digit is clear, to ensure that children understand the process.

- Insist that children make an estimate for the answer to every written calculation before carrying it out. This can then be used to check that the answer they get is reasonable.

- Give children experience of calculations involving gaps. Ask children to work out the missing number or digit:

x	2	?	0.05
6	12	4.2	?

- Build on children's understanding of written methods for whole numbers. Demonstrate multiplication of a decimal number alongside its whole number equivalent: For example:

$$
\begin{array}{r}
326 \\
\times \quad 8 \\
\hline
2400 \\
160 \\
48 \\
\hline
2608
\end{array}
\qquad
\begin{array}{r}
3.26 \\
\times \quad 8 \\
\hline
24.00 \\
1.60 \\
0.48 \\
\hline
26.08
\end{array}
$$