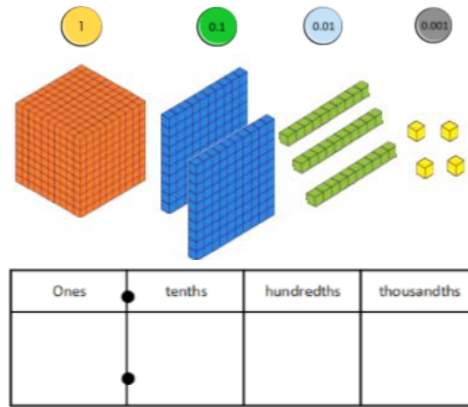


Year 5 Unit 11: Calculating whole numbers and decimals (3 weeks)

Before you start...

- Whole number calculation strategies are extended to use with decimal values. What strategies are your pupils familiar with? What language and models do they use when talking about these strategies?
- What are your pupils' confidence levels with understanding decimal place value with fluency?



Video: Multiplying and dividing by 10 with decimals

Video: Multiplying and dividing by 100 with decimals

0.132

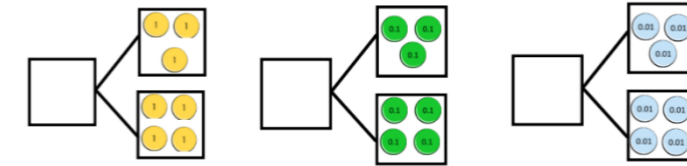
1.32

13.2

Tens	Ones	tenths	hundredths	thousandths
		1	3	2
	1	3	2	
	13	2		

Video: Re-assigning Dienes: Thousandths

Dienes vs Place value counters
Pupils should be fluent in identifying that 0.1 is ten times greater than 0.01, and ten hundredths are equal to one tenth. Dienes provide a powerful experience for showing the relative magnitude of decimal values however they can become unwieldy. Ensure pupils continue to articulate these relationships when place value counters are used.



Developing understanding of decimal numbers

- L1 Represent decimals in a variety of ways
- L2 Multiply and divide by 10, 100 and 1000 involving decimals

By representing decimals in multiple ways, pupils are supported in deepening their understanding of the connections between decimals and fractions. Pupils represent, describe and justify the relationships between the place value columns when multiplying and dividing by 10, 100 and 1000.

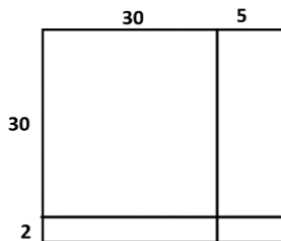
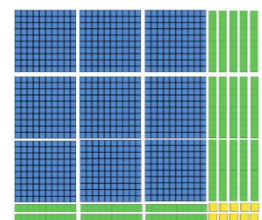
- ? How will you make clear connections with integer calculation in order to support pupils' understanding of our base ten system?
- ? How will you respond to a pupil who justifies by saying 'just move the decimal point'?

Deriving number facts

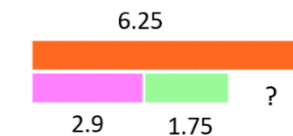
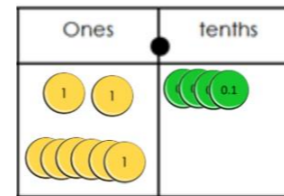
- L3 Derive addition and subtraction facts involving decimal numbers from known facts
- *L7 Derive multiplication facts involving decimals from known facts

L3 and L7 have been grouped together as they both focus on deriving decimal facts from known facts. Make clear connections to experiences with this from earlier in the year. Develop expectations that known facts are referred to by prompting with language structures such as 'if I know __, then I know __'.

- ? What experiences will you provide that highlight the huge number of calculations that can be derived from one simple fact?



$$\begin{array}{r} 1.4 \\ \times 6 \\ \hline 8.4 \end{array}$$



Calculating with long multiplication

- L13 Multiply a whole number using long multiplication
- L14 Solve problems involving prime numbers using long multiplication

These lessons build on experiences with formal methods explored in the year, extending to the use of long multiplication. The area model is a useful representation for supporting explanation of the steps involved with long multiplication.

- ? Often explanations of formal written methods just describe the steps of the procedure. How will you support pupils to focus on their understanding of each step rather than on describing?

Solving problems involving multiplying decimals

- L8 Use a written method to multiply a decimal number
- L9 Explore strategies to multiply decimal numbers
- L10 Solve problems involving decimal numbers

It is crucial to model formal written methods with manipulatives and representations such as place value counters. This is not to calculate with but to represent and demonstrate the steps of the method. Links should be made with multiplying with whole numbers and pupils should be fluent in this before moving on to decimals.

- ? How will you model the process of creating bar models, using known and unknown values from problems?

Solving decimal problems with addition and subtraction

- L4 Use a range of strategies to add decimal numbers
- L5 Use a range of strategies to subtract decimal numbers
- L6 Solve addition and subtraction problems involving decimals

Addition and subtraction strategies that have been explored with whole numbers are now applied to decimal numbers. Moving back and forth between whole numbers and decimals, as well as consistently referring to known facts used to derive, help to reinforce understanding. Pupils should be fluent with a range of strategies: not just written algorithms but also partitioning, rounding and adjusting.

- ? Errors when calculating with decimals can easily be avoided by estimating and checking the reasonableness of answers. What routines are in place to prompt this?
- ? Consider the errors your pupils have made in previous calculation units. How can you build these into your modelling?

Lessons 11, 12 and 15 are suggested consolidation lessons. You may wish to use these earlier in the unit to provide further time to explore challenging concepts or review learning at this stage before long multiplication.

Models in mind:
Consider how you will ensure that the representations that support problem solving are meaningful to pupils and support their own internal sense of the problem. Askew's Models in Mind provides a structure for supporting rich models.