

Year 6 Unit 3: Calculation problems (2 weeks)

Before you start...

- How secure are pupils with the different calculation strategies introduced during earlier units?
- Do pupils understand the equals sign as balance, using 'is equal to'?

Is BODMAS useful?

The acronym BODMAS is often used as a 'hook' for the order of operations. When introduced carefully, this can be beneficial however it can suggest a hierarchy. Pupils should know that multiplication and division have equal priority and therefore can be completed in any order. Colour coding the acronym may be useful: **BODMAS**

Using letters? But this is maths!

The concept of using letters to represent unknown values can be challenging for pupils. Consider:

- Making clear connections with missing number problems represented by boxes and algebraic notation
- Ensuring a range of letters are used so pupils understand letters represent an unknown value and are not attached to the question e.g. *t* is for total, *c* is for cake.



Understanding the agreed order of operations

L1 Understand which operations have equal priority.
 L2 Understand the order of operations including brackets
 L3 Use and apply the order of operations

Pupils learn the agreed order of operations, including the use of brackets, through exploration of different problems. In lesson 1, pupils solve multi-step problems involving addition and subtraction or multiplication and division in different ways to identify that order does not matter and these operations have equal priority. Representations such as cubes can practically demonstrate this, and pupils are encouraged to consider efficiency when doing so e.g. identifying and summing number bonds. In lesson 2, pupils learn that multiplication and division have priority over addition and subtraction through exploring a range of possible answers to one multi-step calculation. They then understand how brackets are used to alter the order of a calculation and the priority these have. Lesson 3 provides opportunities to apply their understanding of the order of operations in different contexts including area and perimeter.

? What representations will you use to support understanding of the equal priority of addition and subtraction?

Exploring problems with unknown values

L4 Generate and describe linear number sequences
 L5 Express missing numbers algebraically
 L6 Create algebraic expressions for different contexts

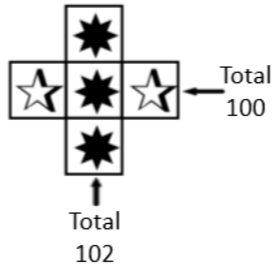
Lesson 4 is a great opportunity to revisit and consolidate different numbers including decimals and negative numbers as they generate, explore and compare a range of linear number sequences. By considering numbers that will and will not appear in given sequences pupils are challenged to reason and explain. Lesson 5 and lesson 6 introduce algebraic notation. Take time to connect this notation to familiar representations of unknown values such as empty box problems and bar models. Through familiar contexts such as the perimeter and area of rectangles, pupils make sense of expressing missing numbers algebraically, and lesson 6 provides opportunities to write algebraic expressions for further contexts.

? How will you ensure all pupils understand how algebraic notation is used to represent unknown values?
 ? What opportunities will you provide for pupils to represent problems concretely and pictorially and make links between algebraic notation?

There are two consolidation lessons within this unit. You may wish to use these to extend the introduction of unknown values and algebraic notation or to extend problem solving opportunities in the final planned lesson.

$2x + y = 7$ and $x + y = 5$

What are the values of *x* and *y*?



Algebraic notation is revisited in later units when it is applied to different contexts e.g. missing angles. Consider how the learning in this unit can be built upon across the year, including in Maths Meetings.

Video: Algebraic expressions with more than one unknown

Solving problems with unknown values

L7 Satisfy equations with two unknowns
 L8 Apply problem solving strategies

Pupils apply their understanding of algebraic notation to problems with more than one unknown, providing opportunities to 'enumerate possibilities', that is, identify that these problems may have more than one correct answer. Again, connections should be made between different representations of unknown values and the focus should be on discussion and reasoning. Lesson 8 consists of a range of non-standard problem contexts and is an opportunity to consolidate learning from this and previous units. Four tasks are provided, and you should take time to consider how these will be presented to and tackled by all pupils.

? How will you ensure a classroom environment where discussion and dialogue are encouraged?
 ? What opportunities for mathematical thinking will you promote in lesson 8?