Algebraic Expressions*

A glimpse into what researchers say:

- Students’ difficulties with algebraic expressions may be because:
  - They do not fully understand how to use important concepts such as factorisation, the square root function or the binomial expansion¹.
  - They may get puzzled by the language used in questions. Words such as ‘simplify’ or ‘solve’ can often be confused by students².
  - The use of mnemonic letters³ (e.g. using the letter $a$ to represent the number of apples) instead of other letters (say $x$ and $y$, or Greek letters), may actually hinder students’ interpretation of algebraic expressions.
- The use of educational games⁴ in the classroom can have a positive impact on students’ achievement in algebraic expressions. Researchers say that mathematical games “stimulate mathematical thinking and generate excitement and spirit of individualism, co-operation and competition.”

Some key properties of algebraic expressions for students to know:

1. Commutative property of addition and multiplication
   (e.g. $2x + 6x = 6x + 2x$ and $2x \times 6x = 6x \times 2x$)
2. Distributive property (e.g. $3(3x + 4y) = 9x + 12y$)
3. Associative property of addition and multiplication (e.g. $x + (y + z) = (x + y) + z$)

Practitioners have also given ideas for mathematical games⁵ to use in the classroom:

- Students are given a card with four algebraic expressions around the four edges of the card and one complex expression in the middle. The challenge is for them to create the middle expression by using the four outside expressions and any of the operations $+, -, \times, \div$ and squares.
- You can find some ideas of mathematical games relating to algebraic expressions in the following link:
  [http://www.twinkl.co.uk/resources/keystage3-ks3-maths/keystage3-ks3-maths-gcse/keystage3-ks3-maths-gcse-algebra/1](http://www.twinkl.co.uk/resources/keystage3-ks3-maths/keystage3-ks3-maths-gcse/keystage3-ks3-maths-gcse-algebra/1)

Some problems you can try with your class …

1. Make $x$ the subject of $a(x - b) = c$
2. Expand $(x + 2)^2$
3. Simplify $7x^2 + 7x + 3 - 4x + x^2$
4. Solve $b^2 - 2b + 1 = 0$
5. Solve $7(2e + 3) = 3(4e + 9)$


* Resources selected and summarised by Rebecca Potiphar. Let us know whether they are useful and how we can improve them at @mathtask or email Irene Biza at i.biza@uea.ac.uk