Module 5: Collecting like terms

Description This short module is for an individual teacher or group of teachers in secondary schools who are considering their teaching of algebra. It discusses some stimulating activities to help pupils to practise collecting like terms.

Other modules which could be combined with this one, either to create a longer session, or to work through in a sequence over time are:

- Module 7: Applying algebraic reasoning
- Module 10: Classroom approaches to algebra

Study time 20 to 30 minutes

Resources Each teacher will need a personal notepad.

Each teacher or pair of teachers working together will need:

- a copy of **Resource 5a**, at the end of this module, and scissors;
- a copy of the algebra strand of the *Revised learning objectives for mathematics* for Key Stages 3 and 4 produced by the Secondary National Strategy (2010), which you can download from:

  nationalstrategies.standards.dcsf.gov.uk/secondary/framework/maths/fwsm/mlo

It would be helpful to have available at least one copy of *Teaching mental mathematics from level 5: Algebra,* published by the Secondary National Strategy (2009), which you can download from:

nationalstrategies.standards.dcsf.gov.uk/node/241296

Collecting like terms

1 Start by considering this question.

- In which year groups do pupils in your school learn to simplify or transform linear expressions by collecting like algebraic terms?
- How does this compare with the yearly teaching programmes of objectives in the revised objectives for mathematics produced by the Secondary National Strategy (2010)?

2 Spend a few minutes jotting down on your notepad the activities and contexts that you currently use to teach pupils to collect like terms.

If you are working with colleagues, discuss and compare your ideas.

Now consider these two questions.

- Are there any differences in your approaches for pupils in Key Stage 3 and Key Stage 4?

- Are there any differences in your approaches for the most able pupils and pupils who struggle with their learning of mathematics?

3 Cut out and shuffle up the cards on **Resource 5a, An algebra loop card game**. Spread out the cards on a flat surface so that you can see them all. Take one of the cards at random and place it to the left of you. Find the answer to the question on this card and place it to the right of the first card to form a line. Carry on until you have used all 18 cards.

This is a self-checking activity in that the last card on the right of the line should link back to the first card on the left.

The activity is one that small groups of pupils can work on collaboratively.

Alternatively, a similar set of cards can be distributed around a whole class to play an 'I have … What is …' loop card or 'follow me' game. A pupil starts the game by reading their algebraic expression and their question. Other pupils follow until all cards have been called and the 'loop' has been completed. As pupils play the game, you can write each new expression on the board for everyone to see.

Take a few moments to think about these questions.

- What is the purpose of this kind of activity?
- What could the advantages be of using an activity like this at the start of a lesson?
- How could the activity be organised or adapted it to make it suitable for pupils at different levels of attainment?

4 For pupils, this type of matching activity provides mental practice in collecting like terms. Every pupil is involved as they think about each question to see whether the answer matches the expression on their card. The complexity of the expressions can be varied and, where pupils play the game in groups, different sets of cards can be given to different groups.

You can find more examples of short and more sustained mental activities in *Teaching mental mathematics from level 5: Algebra,* published by the Secondary National Strategy (2009), which you can download from:

nationalstrategies.standards.dcsf.gov.uk/node/241296

If possible, look at this publication and identify:

- some other activities which could help pupils to practise collecting like terms;
- some other algebraic skills which a loop card game or other matching activity could help pupils to practise.

5 To round off, reflect on these questions.

- What have you learned? What action will you take as a result?

Jot down any points to follow up in further study or other actiobn and any modifications you will make to your planning or teaching.

If you are studying alone, jot down any points you want to discuss with your head of department or colleagues.

Resource 5a: An algebra loop card game

Cut out and shuffle up the 18 cards below. Spread out the cards on a flat surface so that you can see them all.

Take one of the cards at random and place it to the left of you. Find the answer to the question on this card and place it to the right of the first card to form a line.

Carry on until you have used all 18 cards. The last card on the right of the line should link back to the first card on the left.

I have $3a - b$ Subtract b	I have $2a + 4b$ What is $4a$ more than this?	I have $3a - 5b$ What is $4b$ more than this?
I have $6a - 3b$ What is **one third** of this?	I have $3a + 4b$ What is $9b$ less than this?	I have $7a - 2b$ What is $a + b$ less than this?
I have $3a + 5b$ What is $a + b$ less than this?	I have $-a - b$ Add $3b$	I have $3a + 3b$ What is $2b$ more than this?
I have $2b$ What is $a + b$ more than this?	I have $2a - b$ What is **double** this?	I have $2b - a$ What is a more than this?
I have $6a + 4b$ What is a more than this?	I have $7a + 4b$ Subtract $4a$	I have $a + 3b$ What is $2a$ more than this?
I have $-2a - 2b$ What is **half** of this?	I have $3a - 2b$ Add $4a$	I have $4a - 2b$ What is $6a$ less than this?