Number tricks

Generalising from number

Prerequisite knowledge

- Mental arithmetic that enables pupils to undertake simple calculations using the four rules applied to one- and two-digit numbers

Why do this problem?

This leads neatly into formal algebra and its magic. Pupils are intrigued and motivated about the certainty that accompanies knowing an underlying structure.

Time

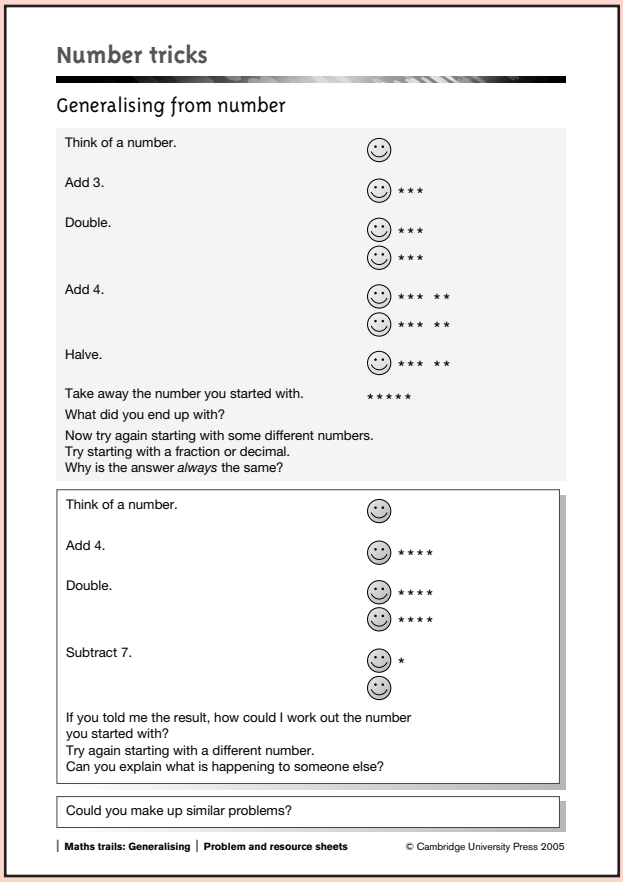
One lesson

Resources

CD-ROM: pupil worksheet; OHTs of the two number tricks

NRICH website (optional): www.nrich.maths.org, May 2004, 'Number tricks' (the two interactive tools can be used as an alternative to the OHTs)

Pupils need mini-whiteboards for the introduction.



Number tricks

Generalising from number

Think of a number.

Add 3.

Double.

Add 4.

Halve.

Take away the number you started with.

What did you end up with?

Now try again starting with some different numbers.
Try starting with a fraction or decimal.
Why is the answer *always* the same?

Think of a number.

Add 4.

Double.

Subtract 7.

If you told me the result, how could I work out the number you started with?
Try again starting with a different number.
Can you explain what is happening to someone else?

Could you make up similar problems?

Maths trails: Generalising | Problem and resource sheets

Introducing the problem

Ask pupils to think of a number. Go through the operations of the first number trick using the OHT from the CD-ROM (revealing the steps one by one helps to engage pupils' interest); ask pupils to write their final answer on their whiteboard. (They could use the whiteboard to jot down calculations as they go along.) In revealing their answers, with luck, pupils will notice that they all have the answer 5. Any discrepancies could be discussed and checked to ensure that all pupils understand the process.

Main part of the lesson

Reveal on an OHT each step of the second number trick on the problem sheet. This symbolic form will support pupils' understanding of what is happening.

- What number did we end with?
- Will this always be the case?

Invite pupils to try the number trick again themselves a few times with some different numbers.

When they feel confident, ask them to alter the algorithm in order to end up with an answer of 6. What other totals can they make?

Plenary

Which answers have pupils been able to make by altering the number trick?

Invite one pupil or pair to challenge the rest of the class to find the algorithm for that particular answer.

Solution notes

The answer to the **first trick** is always 5.

When changing the final number, the second addition will always be even and the final number will always be the first added number plus half the second added number. For example, 5 = 3 + half of 4.

In the **second trick**, subtract 1 and halve.