



# INVESTIGATION



Many Make One

$$\frac{1}{2} = \frac{a}{20} + \frac{b}{20} + \frac{c}{20}$$

# MathSphere

## Many Make One

Here is a puzzle for you:

$$\frac{a}{n} + \frac{b}{n} + \frac{c}{n} = \frac{1}{4}$$

Can you find values for **a**, **b** and **c** if **n** = 40 ?

### Other ideas:

When you have cracked the problem above, you could try some of these:

1. Find values for **a**, **b** and **c** if **a** = **b** = **c** ?
2. Find values for **a**, **b** and **c** if **a**, **b** and **c** are all different?
3. Find values for **a**, **b** and **c** if **a** is twice **b** and **b** is twice **c** ?
4. Find values for **a**, **b** and **c** if **n** = 40 and then investigate what happens to **a**, **b** and **c** when **n** is halved or doubled or multiplied or divided by another number (4, 5 etc) ?
5. Extend this problem to four or five fractions. Fix the value of **n** and decide on a rule (**a** is twice **b** and **b** is twice **c** etc). Can you find some general rules for quickly working out what **a**, **b** and **c** must be?
6. In the sum:

$$\frac{a}{n} + \frac{b}{n} + \frac{c}{n} = \frac{1}{4}$$

Find values of **a**, **b**, **c** and **n** that make the sum true.

Then find out what happens to the answer if **a**, **b** and **c** are all divided by 2 or 3 etc.

## **Answer Guide**

This is the harder of two investigations about dividing fractions into component fractions. The easier (entitled 'Three Make One') includes no algebra.

In order to make progress with this investigation, children need to know how to manipulate equivalent fractions and have a good facility with substituting values for letters. The module provides good practice at this and the language of algebra.

They may need some guidance in how best to choose the number by which they should multiply the numerator and denominator (denominating) so that the fraction can be split as desired.