5.2 Equivalent Ratios

Objectives

- Find equivalent ratios.
- Express ratios in simplest form.
- Use a comparison model to represent a ratio of two quantities.
- Solve word problems involving ratio.

Material

- Counters
- Appendix pp. a27-a28

Prerequisites

Students should be comfortable with finding common factors for numbers, as with simplifying fractions. Students should also be familiar with bar models, particularly the comparison model for multiplication and division, and the idea of first finding the value of 1 unit.

Notes

In this part students will learn to find equivalent ratios and reduce a ratio to simplest form.

The concepts are exactly the same as with fractions, and in fact ratios can be written as fractions. Students will relate ratios to fractions in *Primary Mathematics* 6, so it is not necessary to emphasize the relationship at this time.

If each term (each number) of a ratio has a common factor, the ratio can be written in simpler terms. 8 : 4, 4 : 2, and 2 : 1 are equivalent ratios.

If there is no common factor for all the terms, then the ratio is in its simplest form. 2 : 1 is the simplest form of the ratio 8 : 4.

We simplify a ratio by dividing each term of the ratio by its common factors. We can divide 12 and 18 by the common factor 6. We can show this step using cancellation – crossing out the term and writing the quotient after dividing each term by the same factor.

$$\cancel{12}^{2} : \cancel{18}^{3} = 2 : 3$$

$$12 : 18 = 6 : 9 = 2 : 3$$

Reducing a ratio to its simplest form can be done in several steps. In the example at the right, in the first step the common factor is 2, and in the second it is 3.

Once a ratio is given in simplest form, without the original quantities, the process cannot be reversed. Knowing the ratio is not enough to determine what the actual quantities or measurements were.

Since in a ratio two quantities are being compared, we can use a comparison model to illustrate word problems involving ratios. For example, the ratio of A to B is 5 : 7. This can be diagrammed using 5 units for A and 7 units for B. If we are given the actual value for a unit or multiple of a unit, such as the value for A, B, the total, or the difference between A and B, we can find the value for 1 unit by division. Once we find the value for 1 unit, we can find other values using multiplication.
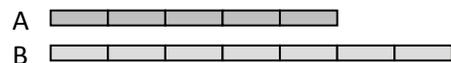
Given: A = 100. Find B.
5 units = 100
1 unit = 20
7 units = 140
B = 140