

UNIT 5 *Ratio and Proportion*

Introduction to SIM

Learning objectives

The work in this unit deals with the important topic of *ratio* (or *proportion*) and its application to map scales. After completing this unit of STUDENT INSTRUCTIONAL MATERIAL (SIM) you should be able to

- find and simplify ratios
- apply ratios to problems in context
- find and use map scales
- divide quantities into given ratios (or proportions).

Key points and principles

- The ratio $m : n$ is equivalent to $1 : \frac{n}{m}$ or $\frac{m}{n} : 1$
- To divide a quantity in the ratio $m : n$, you need to calculate the fractions $\frac{m}{n+m}$ and $\frac{n}{n+m}$ of the quantity.
- As a map scale *increases*, the map length representing the distance between two points *decreases*.

Facts to remember

- The ratios $m : n$, $1 : \frac{n}{m}$, $\frac{m}{n} : 1$, etc. are all equivalent.
- A map scale, say of $1 : 50\,000$, means 1 cm on the map represents the actual distance 50 000 cm (= 500 m = $\frac{1}{2}$ km).

Glossary of terms

Equivalent ratios $m : n$ is equivalent to $1 : \frac{n}{m}$ or $\frac{m}{n} : 1$

For example, $5 : 2$ is equivalent to $1 : \frac{2}{5}$ or $\frac{5}{2} : 1$

UNIT 5 *Ratio and Proportion*

Introduction to SIM

Dividing a quantity in the ratio $m : n$ means dividing the quantity into two parts, that is, the fractions

$\frac{m}{(m+n)}$ and $\frac{n}{(m+n)}$ of the quantity.

For example, Divide \$40 in the ratio 3 : 2.

The two parts are

$$\frac{3}{5} \times \$40 = \$24$$

$$\text{and } \frac{2}{5} \times \$40 = \$16$$

Map scale A map scale of 1 : n means that 1 cm on the map represents an actual distance of n cm.

For example, What distance does 2 cm represent on a map with scale 1 : 50 000 ?

2 cm on the map represents a distance of

$$\begin{aligned} 2 \times 50\,000 \text{ cm} \\ = 100\,000 \text{ cm} = 100 \text{ m} = 1 \text{ km} \end{aligned}$$