

Scales and Maps

London is a very big place, and a map of it must be small enough to hold in your hand – an area of almost 1000 square miles must be scaled down so that it can fit on much less than 1 square metre of paper. The scaling here is typically 1:200,000 but may not be expressed in these units. We may be told 1cm:1km. 1:200000 and 1cm:2km are the same scale with different units:

$$1 : 200000 \rightarrow 1\text{cm} : 200000\text{cm} \rightarrow 1\text{cm} : 2000\text{m} \rightarrow 1\text{cm} : 2\text{km}$$

We may be given the scaling in either form and have to know how to move from one to the other. To scale for example from 1cm:5miles to a form independent of units:

$$1\text{cm} : 5\text{miles} \rightarrow 1\text{cm} : 5 * 1600\text{m} \rightarrow 1\text{cm} : 8000\text{m} \rightarrow 1\text{cm} : 800000\text{cm} \rightarrow 1 : 800000$$

Examples:

The road from London to Leicester is 7cm on the map. The scale of the map is 1:200000 . Find the distance from London to Leicester in miles.

$$1 : 3000000 \rightarrow 1\text{cm} : 3000000\text{cm} \rightarrow 1\text{cm} : 30000\text{m} \rightarrow 1\text{cm} : 30\text{km} \rightarrow 1\text{cm} : 18.75\text{miles}$$

The distance from London to Leicester is $7 * 18.75 = 131.25$ miles.

The distance from Edinburgh to Glasgow is 70km. On a 1:100000 map find the distance.

$$1 : 100000 \rightarrow 1\text{cm} : 100000\text{cm} \rightarrow 1\text{cm} : 1000\text{m} \rightarrow 1\text{cm} : 1\text{km} \quad \text{so } 70\text{km is represented by } 70\text{cm on the map.}$$