

# Scaling in Maps

On a map you often see a **scale** such as 1:120,000 or 1:10,000 or 1:2,000,000. These scales are simply ratios that tell you how the distances measured on the map relate to distances in reality.

A scale of **1:120,000** means that **1 unit on the map corresponds to 120,000 units in reality**. This holds true whether you use centimeters, millimeters, or inches as your units. So 1 cm on that map corresponds to 120,000 cm in reality. And 1 inch on the map corresponds to 120,000 inches in reality.

**Example 1.** A map has a scale 1:150,000. How long in reality is a distance of 7 cm on the map?

Since 1 cm corresponds to 150,000 cm, then 7 cm corresponds to  $7 \times 150,000 \text{ cm} = 1,050,000 \text{ cm}$ .

To be useful, this figure needs to be converted to kilometers. You can do this in two steps:

1. From centimeters to meters: Since  $1 \text{ m} = 100 \text{ cm}$ , we knock two zeros off of 1,050,000 cm to get 10,500 meters (or you can think of dividing by 100).
2. From meters to kilometers: Since  $1 \text{ km} = 1,000 \text{ m}$ , then 10,500 meters corresponds to 10.5 km (or you can think of dividing by 1,000).

So 7 cm on the map represents 10.5 km in reality.

1. A map has a scale ratio of 1:20,000.  
Fill in the tables.

on map	in reality (m)
3 cm	
5 cm	

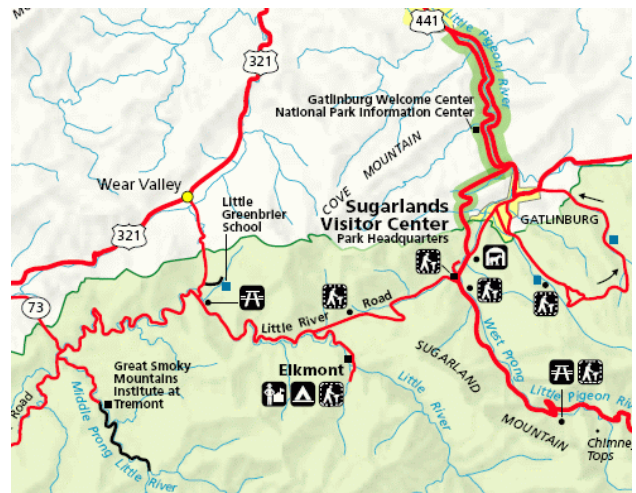
on map	in reality (km)
17 cm	
22 cm	

2. A ski track measures 5.2 cm on a map with a scale of 1:100,000.  
How long is the ski track in reality?

3. Measure the air (aerial) distances with a centimeter ruler and then calculate the distances in reality.  
(Air distances are distances you measure directly from point to point and not by following along the roads.)

The places are marked with squares on the map.

- a. from Elkmont to the Gatlinburg Welcome Center
- b. from the Great Smoky Mountains Institute at Tremont to the Little Greenbrier School
- c. from the Little Greenbrier School to Elkmont



Scale 1:180,000