Some maps can have a different west-east scale than north-south scale. The Mercator map (figure 1) which has a progressive scale starting at the equator has to be pointed out. The Mercator projection is used for nautical charts because the course-lines are presented as straight lines. All paralle are stretched and the pole is not visible ar more as it lays in the infinite. See figure 2 for the special scale needed the Mercator map.

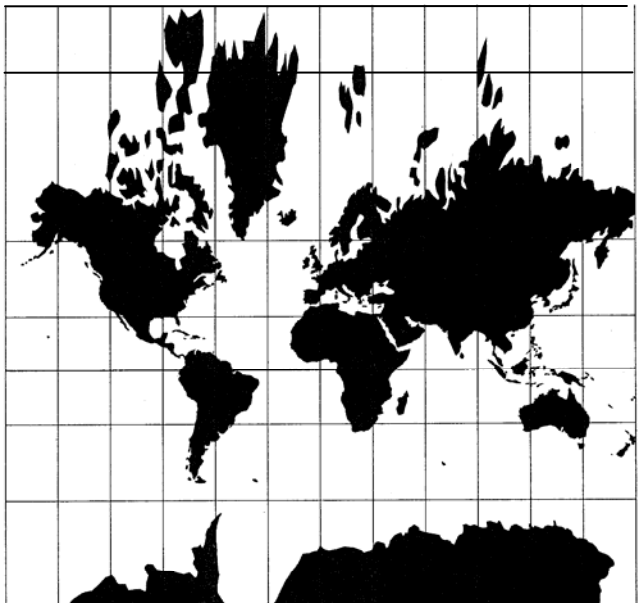

Figure 1: Mercatorian map (Brandenberger, 1996)

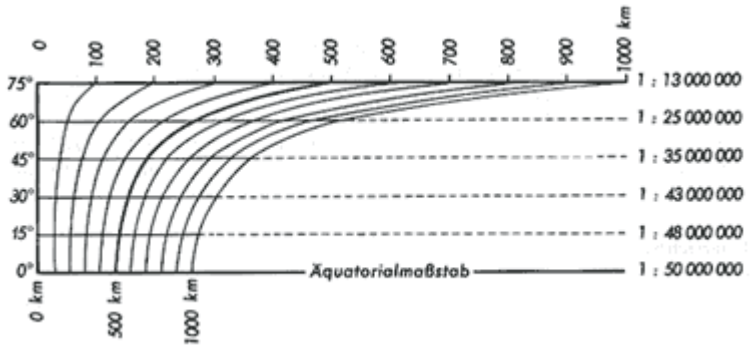

Figure 2: Progressive scale (Imhof, 1950)

On some maps you might still find a slope diagram (figure 3) from which the angle of slope can be deducted. For the horizontal contour line interval, the inclination can either be extracted in:

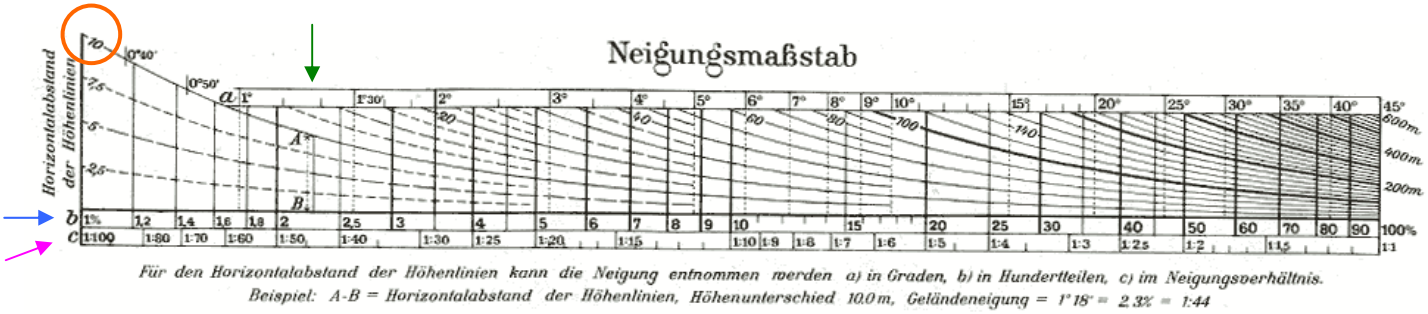

Figure 3: Slope Diagram – taken from a German topographic map at the scale of 1: 50 000 published in 1963 (Landesvermessungsamt Baden Württemberg 1963)

- Degree
- Hundredths / Percent
- Ratio

The description below figure 3 shows how it works:

1. Measure the distance between point A and B which characterises the horizontal distance of the contour lines. Look at the ◯ to find the solution of 10.0 meter.
2. Its angle of slope in degree you find at this → position. Solution: 1° 18‘‘
3. The angle of slope in percent at this → position: Solution: 2,3%
4. And its expression in ratio: → Solution: 1: 44

If you have a map without any scale at all, apply the following procedure to find out the missing scale:

- Chose two significant points on a map where you can find a linear scale.
- Take the denominator of the scale (x_1)
- Measure this distance in cm (y_1) .
- Take the map without scale and find the same two significant points.
- Measure this distance in cm (y_2)
- Calculate the scale of your map as follows:

$$\frac{y_1}{y_2} = \frac{x_2}{x_1} \longrightarrow x_2 = x_1 * \frac{y_1}{y_2}$$

- x_2 is the scale value. To get the map scale just built the reciprocal value of it: $1 : x_2$

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Brandenberger, Ch., 1996. Verschiedene Aspekte und Projektionen für Weltkarten. Institut für Kartographie, ETH Zürich.

Imhof, E., 1950. Gelände und Karte. Eugen Rentsch Verlag. Erlenbach – Zürich

Landesvermessungsamt Baden Württemberg, 1963. Topographische Karte 1:50'000.