

Map Scale

The map scale is printed in the map legend. It is given as a ratio of inches on the map corresponding to inches, feet, or miles on the ground. For example, a map scale indicating a ratio of 1:24,000 (in/in), means that for every 1 inch on the map, 24,000 inches have been covered on the ground. Ground distances on maps are usually given in feet or miles.

Map Scale Conversion Factors

Scale	Representative Fraction	Map in/mi	Map in/ch
1:253,440	253.44	0.25	0.0031
1:126,720	126.72	0.50	0.0063
1:63,360	63.36	1.00	0.0125
1:62,500	62.50	1.01	0.0127
1:31,680	31.68	2	0.025
1:24,000	24.00	2.64	0.033
1:21,120	21.12	3	0.038
1:15,840	15.84	4	0.05

5.2 Map Scale

1:7,920

7.92

8

0.1

Table 5.1. Map Scale Conversion Factors

Example 1 - Convert the map scale of 1:24,000 (in/in) to (in/ft).

Step 1. Set up the cancellation table so all units will cancel, except the desired unit, ft/in.

$$\begin{array}{|c|c|} \hline \frac{24,000 \text{ inches}}{\text{inch}} & \frac{1 \text{ foot}}{12 \text{ inches}} \\ \hline \end{array} = \frac{2,000 \text{ feet}}{\text{inch}}$$

On the map 1 inch is equal to 2,000 feet on the ground, 1:2,000 (in/ft).

Example 2 - Convert the 1:2,000 (in/ft) to (in/mile).

Step 1. Set up the cancellation table so all units will cancel, except the desired unit, miles/inch.

$$\begin{array}{|c|c|} \hline \frac{2,000 \text{ feet}}{\text{inch}} & \frac{1 \text{ mile}}{5,280 \text{ feet}} \\ \hline \end{array} = \frac{0.4 \text{ miles}}{\text{inch}}$$

On the map 1 inch is equal to 0.4 miles.

Example 3a - The map distance between two points is 6 inches. The map scale is 1:24,000 (in/in). What is the ground distance in feet?

Set up the cancellation table so all units will cancel, except the desired unit, feet.

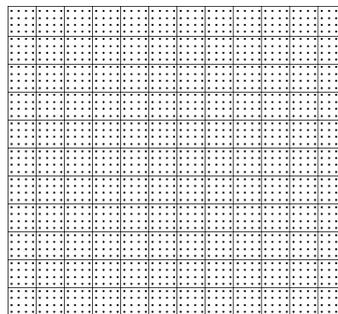
$$\begin{array}{|c|c|c|} \hline \frac{24,000 \text{ inches}}{1 \text{ inch}} & \frac{1 \text{ foot}}{12 \text{ inches}} & 6 \text{ inches} \\ \hline \end{array} = 12,000 \text{ feet}$$

The ground distance is 12,000 feet.

Using the Modified Acreage Grid (Transparency)

To use the acreage grid transparency, follow these steps:<

1. Place the acreage grid transparency over the area to be measured.
2. Count dots inside the sketched area. Count every other dot when dots fall on the boundary line.
3. Multiply the total number of dots by the conversion factor on the map scale to determine the total acreage. (See Table 5.2.)



Map Scales and Equivalents

Scale	Inches per mile	Acres per square corner	Conversion factor that each d
1:20,000	3.168	63.769	1.736 Acres
1:24,000	2.640	91.827	2.500 Acres
1:62,500	1.014	622.449	16.946 Acres
1:63,360	1.000	640.000	17.424 Acres

Table 5.2 Acreage Grid Overlay, Map Scales, and Equivalents.

Example 3b - Using the information in Example 3a, find the ground distance in chains, miles, and inches.

5.2 Map Scale

Step 1. Set up the cancellation table so all units will cancel, except the desired unit, chains.

$$\begin{array}{|l|l|} \hline 12,000 \text{ feet} & 1 \text{ chain} \\ \hline & 66 \text{ feet} \\ \hline \end{array} = 182 \text{ chains}$$

$$12,000 \text{ feet} = 182 \text{ chains}$$

Step 2. Set up the cancellation table so all units will cancel, except the desired unit, miles.

$$\begin{array}{|l|l|} \hline 12,000 \text{ feet} & 1 \text{ mile} \\ \hline & 5,280 \text{ feet} \\ \hline \end{array} = 2.3 \text{ miles}$$

Step 3. Set up the cancellation table so all units will cancel, except the desired unit, inches.

$$\begin{array}{|l|l|} \hline 12,000 \text{ feet} & 12 \text{ inches} \\ \hline & 1 \text{ foot} \\ \hline \end{array} = 144,000 \text{ inches}$$

$$12,000 \text{ feet} = 182 \text{ chains} = 2.3 \text{ miles} = 144,000 \text{ inches}$$

Occasionally, a map may not provide a scale. The scale can be calculated by knowing the distance between two points on the map, and measuring the distance on the map. Also, if a map has section lines, the distance between section lines is typically 1 mile.

Example 4 - The distance between point A and B is 6 inches on the map. The known ground distance is 3,600 feet. What is the scale in units of inches/foot?

$$\text{map scale} = \frac{\text{known distance}}{\text{measured distance}} = \frac{3,600 \text{ feet}}{6 \text{ inches}} = \frac{600 \text{ feet}}{\text{inch}}$$

The map scale is 1:600 inches/foot.

Example 5 - Use the map scale in example 6. The known ground distance between points B and C is 1/2 mile. How many inches is does this distance correspond to on the map?

$$\text{map scale} = \text{known distance} / \text{measured distance}$$

5.2 Map Scale

Rearrange terms by multiplying each side by the measured distance and dividing each side by the map scale.

measured distance = known distance / map scale

Step 1. Set up the cancellation table so all units will cancel, except the desired unit, feet.

$$\frac{1/2 \text{ mile} \mid 5,280 \text{ feet}}{1 \text{ mile}} = 2,640 \text{ feet}$$

Step 2. Use the map scale from Example 6 to find the map distance.

measured distance = known distance

map scale

measured distance = 2,640 feet 1 inch = 4.4 inches

600 feet

On the ground one-half mile is the same as 4.4 inches on the map.