

Scale Drawings

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A *scale drawing* is a representation of a real object on paper; the drawing is proportionally smaller (or larger) than the actual object. The ratio between any given length in the drawing and the corresponding actual length of the object is called the *scale*. This ratio is used to find other measurements.

Suppose, for example, you have a scale drawing that shows the elevation of the Eiffel Tower. The height on the scale drawing is the scale of the drawing times the actual height of the tower.

The scale may be given as a ratio, such as $s = 1 : 50$, meaning that distances in the drawing are $\frac{1}{50}$ the corresponding distances in the real object.

If the drawing is smaller than the real object (e.g., in the drawing of a building), then $s < 1$, and the drawing is a *reduction*.

If the drawing is larger than the real object (e.g., in the drawing of the anatomy of an insect), then $s > 1$, and the drawing is an *enlargement*.

Units

The scale s is a pure number with no units. But scale information about a drawing is often reported using units.

For example, suppose the real object is a building with lengths measured in meters and the lengths in the scale drawing are measured in centimeters. A scale of $1 : 50$ might be given instead as "2 centimeters per meter" or as "2 cm : 1 m" or as "2 centimeters equals 1 meter." This means that 1 centimeter on the drawing corresponds to $\frac{1}{2}$ meter on the building.

Or, suppose the real object is a city with distances measured in miles and the lengths in a map of the city are measured in inches. The scale of the map might be given as " $\frac{1}{2}$ inch per mile" or " $\frac{1}{2}$ in. : 1 mi." This means that 1 inch on the map corresponds to 2 miles in the city. (Using 12 inches per foot and 5,280 feet per mile, the scale of such a map would be 1 : 126,720.)

In this drawing, $\frac{1}{4}$ in. is equal to 1 ft. ($\frac{1}{4}$ inch may not be $\frac{1}{4}$ of an inch on your screen.)

