

5-2B Scale Drawings

Scale Drawing or Model – a two dimensional drawing used to represent an object that is too large or too small to be drawn or built at actual size.

Note: measurements on a drawing or model are proportional to the measurements of the actual objects

Scale: $\frac{\text{drawing/model size}}{\text{actual size}}$

Scale – ratio with units that determines how the drawing or model is related to the actual object.

** drawing or model is always on top*

Scale Factor – scale without units. (in simplest form)

** To convert scale to scale factor, we must first have the same units on both top and bottom of ratio → convert to smaller unit*

Ex. 1: Find the scale.

A. A model car is 4in long. The actual car is 12ft long.

What is the scale of the model?

$$\text{Scale} = \frac{\text{model}}{\text{actual}} = \frac{4\text{in}}{12\text{ft}} = \boxed{\frac{1\text{in}}{3\text{ft}}}$$

** Always reduce numerator to equal "1"*

Ex. 2: Find the scale factor.

A. 4in = 10ft → w/o units

$$\text{Scale} \rightarrow \frac{4\text{in}}{10\text{ft}} = \frac{4\text{in}}{120\text{in}} = \boxed{\frac{1}{30}}$$

*1ft = 12in
10ft = 120in*

B. 6cm = 1.5mm

$$\text{Scale} \rightarrow \frac{6\text{cm}}{1.5\text{mm}} = \frac{60\text{mm}}{1.5\text{mm}} = \boxed{\frac{40}{1}}$$

*1cm = 10mm
6cm = 60mm*

Ex. 3: Use proportions to find unknown lengths.

A. A map has a scale of 1in = 8mi. Two towns are

$3\frac{1}{4}$ in apart on the map. What is the actual distance between the two towns?

map
actual

$$\frac{1\text{in}}{8\text{mi}} = \frac{3.25\text{in}}{x\text{mi}}$$

$$x = 8(3.25)$$

$$x = 26\text{ miles}$$

B. Given a scale 1in = 20ft, find the dimensions of the room based on the drawing below. ↪ length & width



width

$$\frac{1\text{in}}{20\text{ft}} = \frac{\frac{3}{4}\text{in}}{w\text{ft}}$$

$$w = 20\left(\frac{3}{4}\right)$$

$$w = 15\text{ ft}$$

length

$$\frac{1\text{in}}{20\text{ft}} = \frac{\frac{5}{8}\text{in}}{l\text{ft}}$$

$$l = 20\left(\frac{5}{8}\right)$$

$$l = 12.5\text{ ft}$$

Dimensions:
12.5 ft by 15 ft

C. Given a scale of 1in = 20ft, find the size of the drawing if the actual size of a kitchen is 9ft by 12 ft.

length

$$\frac{1\text{in}}{20\text{ft}} = \frac{l\text{in}}{9\text{ft}}$$

$$9 = \frac{20l}{20}$$

$$l = \frac{9}{20}\text{ in}$$

width

$$\frac{1\text{in}}{20\text{ft}} = \frac{w\text{in}}{12\text{ft}}$$

$$\frac{12}{12} = \frac{20w}{12}$$

$$w = \frac{5}{3}\text{ in}$$

Dimensions:
 $\frac{9}{20}$ in by $\frac{5}{3}$ in