

7.5 Scale Drawings and Models p.300

A scale **drawing** is a proportional, **two-dimensional** drawing of an object. example: *molecule; map; picture of a flower*

A scale **model** is a proportional, **three-dimensional** model of an object. example: *globe; atom; dinosaur; statue of liberty*

The **scale** gives the **ratio** that **compares the measurements of the drawing or model with the actual measurements.**

example: $\frac{1 \text{ cm}}{40 \text{ m}}$ or 1 cm : 40m

$$\text{SCALE} = \frac{\text{model/drawing}}{\text{actual}}$$

* the scale is often DIFFERENT units

Examples

The scale of a map is 1 cm : 50 mi

- a) Find the distance between Camarillo and San Diego if they are 3 cm apart on a map.

$$\frac{1 \text{ cm}}{50 \text{ mi}} = \frac{3 \text{ cm}}{x \text{ mi}} \quad \boxed{150 \text{ mi}}$$

- b) Find the distance between Ventura and Thousand Oaks if they are 0.5 cm apart on a map.

$$\frac{1 \text{ cm}}{50 \text{ mi}} = \frac{0.5 \text{ cm}}{x \text{ mi}} \quad \boxed{25 \text{ mi}}$$

- c) Find the map distance if Camarillo is 850 miles from Boise, ID.

$$\frac{1 \text{ cm}}{50 \text{ mi}} = \frac{x \text{ cm}}{850 \text{ mi}} \quad \boxed{17 \text{ cm}}$$

Scale Factor: when a scale is written **WITHOUT UNITS** (b/c they are the same) *written as a ratio (fraction)*

- Always convert the **larger** unit to the **smaller** unit so that the units match

larger to smaller → multiply
smaller to larger → divide

Examples

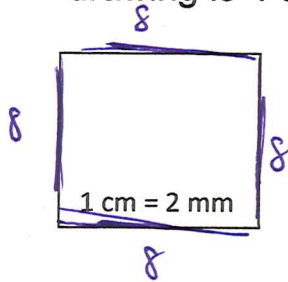
a) A scale model is 1 in : 10 ft. Find the scale factor.

$$\frac{1 \text{ in}}{10 \text{ ft}} = \frac{1 \text{ in}}{120 \text{ in}} \quad \boxed{\frac{1}{120}} \begin{matrix} \rightarrow \text{model} \\ \rightarrow \text{actual} \end{matrix}$$

b) A scale drawing has a scale of 20cm : 1 mm. Find the scale factor.

$$\frac{20 \text{ cm}}{1 \text{ mm}} = \frac{200 \text{ mm}}{1 \text{ mm}} \quad \boxed{\frac{200}{1}} \begin{matrix} \rightarrow \text{model} \\ \rightarrow \text{actual} \end{matrix}$$

c) Find the area and perimeter of a computer chip if the scale drawing is 4 cm x 4 cm.



$$\frac{1 \text{ cm}}{2 \text{ mm}} = \frac{4 \text{ cm}}{X \text{ mm}}$$

8 mm

$$A: lw \ 8 \cdot 8 = \boxed{64 \text{ mm}^2}$$

$$P: 4 \cdot 8 = \boxed{32 \text{ mm}}$$

d) An actual billboard sign is 8 ft x 16 ft. The scale is 1 in : 4 ft.

a. What is the area of the drawing?

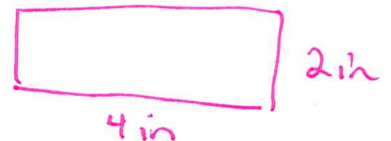
$$\boxed{8 \text{ in}^2}$$

$$\frac{1 \text{ in}}{4 \text{ ft}} = \frac{x \text{ in}}{8 \text{ ft}} \quad \frac{1 \text{ in}}{4 \text{ ft}} = \frac{x \text{ in}}{16 \text{ ft}}$$

$2 \text{ in} \times 4 \text{ in}$

b. What is the perimeter of the drawing?

$$\boxed{12 \text{ in}}$$



c. What is the scale factor?

$$\frac{1 \text{ in}}{4 \text{ ft}} = \frac{1 \text{ in}}{48 \text{ in}} \quad \boxed{\frac{1}{48}}$$