Geometry 7.7
Interpret scale models
Use scale factors to solve problems
scale factor
scale model
scale drawing
scale
activity: maps & blueprints

pre-image
3D image
2D

SF<1 red.
SF>1 enlg
SF=1 ≅

Quiz Thurs.
7.5-7.6

inches → ft.

Why?

- In Saint-Luc, Switzerland, Le Chemin des planetes, has constructed a scale model of each planet in the solar system. It is one of the largest complete three-dimensional scale models of the solar system. The diameter of the center of the model of Saturn shown is 121 millimeters; the diameter of the real planet is about 121,000 kilometers.

$\frac{121 \text{ mm}}{121{,}000 \text{ km}}$

$\frac{121}{121{,}000{,}000{,}000}$

Set up a proportion

Example 1 Use a Scale Drawing

MAPS The scale on the map shown is 0.4 inch : 40 miles. Find the actual distance from Nashville to Memphis.

10 km

$\frac{0.4 \text{ in}}{40 \text{ miles}} = \frac{6 \text{ in}}{x \text{ miles}}$

1. **MAPS** Find the actual distance between Nashville and Chattanooga.

$\frac{0.4x}{0.4} = \frac{240}{0.4}$

$x = 600 \text{ mi}.$

$\frac{0.4 \text{ in}}{40 \text{ mi}} = \frac{2.5 \text{ in}}{x \text{ mi}}$

$0.4x = 16$

$x = 40 \text{ mi}$

$\frac{0.4\text{ in}}{40\text{ mm}}$ $\frac{1\text{ in}}{1\text{ ft}}$ $\frac{1\text{ in}}{12\text{ in}}$

scale on a map (can sometimes mix units) example: map, blueprint

"**scale factor**" (always same units), model length first example: building a model car

↑ How many times as big?

2 Use Scale Factors The scale factor of a drawing or scale model is written as a unitless ratio in simplest form. Scale factors are always written so that the model length in the ratio comes first.

Example 2 Find the Scale

SCALE MODEL This is a miniature replica of a 1923 Checker Cab. The length of the model is 6.5 inches. The actual length of the car was 13 feet.

a. What is the scale of the model? $\frac{6.5 \text{ in}}{13 \text{ ft}}$

What is the scale factor? $\frac{6.5}{156} = \frac{1}{x}$

same unit

b. How many times as long as the actual car is the model?

$\frac{1}{24}$

$\frac{6.5x}{6.5} = \frac{156}{6.5}$ $x = 24$

Scale:
Mixed units ok (always label)
Simplify answers

SF: Always same unit (scale factor)
...how many times as big...

$\frac{1\text{ ft}}{12\text{ ft}}$

2. SCALE MODEL Mrs. Alejandro's history class made a scale model of the Alamo that is 3 feet tall. The actual height of the building is 33 feet 6 inches.

A. What is the scale of the model?

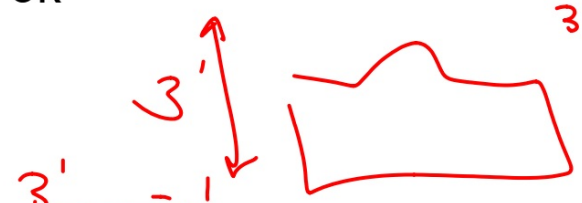
B. How many times as tall as the actual building is the model? How many times as tall as the model is the actual building?

messy: change to same unit... smaller unit is usually easier
(inches instead of feet, etc.)

Mixed units ok

(scale factor ...same unit)

33'6"
33.5'



$\frac{3'}{33.5'} = \frac{1}{x}$ $3x = 33.5$ $x \approx 11.2$

Real-WorldLink

The St. Louis Gateway Arch is the tallest national monument in the United States at 630 feet. The span of the base is also 630 feet. The arch weighs 17,246 tons and can sway a maximum of 9 inches in each direction during high winds.

Source: Gateway Arch Facts

Real-World Example 3 Construct a Scale Model

SCALE MODEL Suppose you want to build a model of the St. Louis Gateway Arch that is no more than 11 inches tall. Choose an appropriate scale and use it to determine the height of the model. Use the information at the left.

7.7 p. 521

S-11

- Proportion
- 1 inch = ???
- use friendly numbers for scale (bec. you are building it)
- has to fit in 11 inches
- round down if necessary (bec. it has to fit)