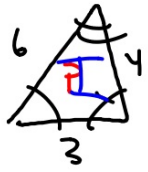
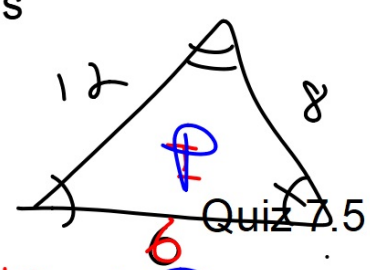
Geometry 7.7
Interpret scale models
Use scale factors to solve problems
scale factor
scale model
scale drawing
scale
activity: maps & blueprints

$\frac{6}{12}$ $\frac{12}{6}$



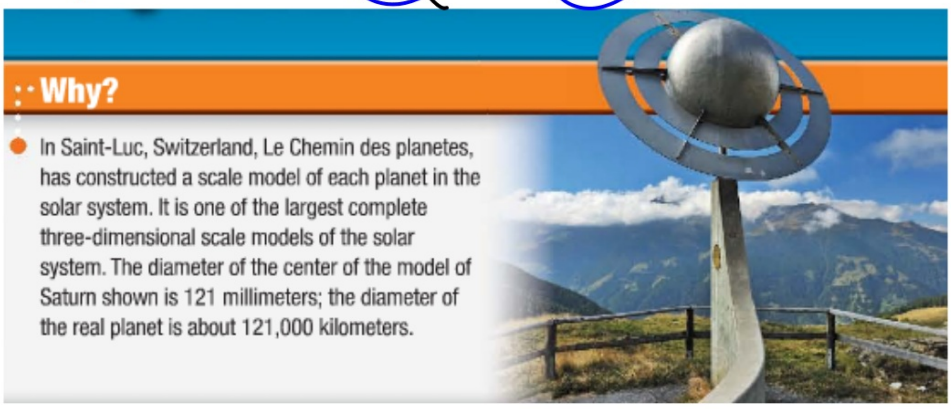


Quiz 7.5

Drawn to a. Scale

E R

$\frac{12}{6} = \frac{2}{1}$ $\frac{6}{12}$ $\frac{1}{2}$



Set up a proportion

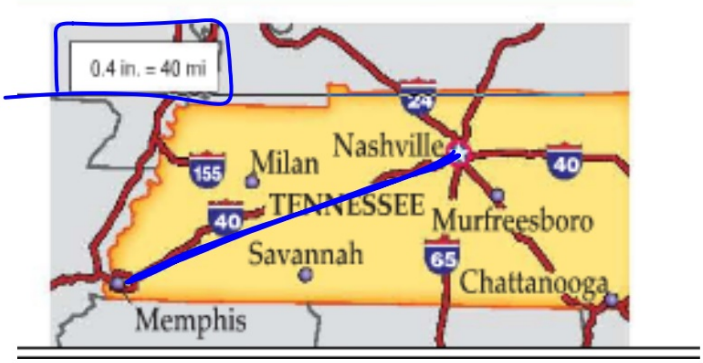
Example 1 Use a Scale Drawing

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

$$\frac{0.4\text{ in}}{40\text{ mi}} = \frac{5\text{ in}}{x\text{ mi}}$$

$$200 = 0.4x$$

$$500\text{ mi} = x$$



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

$\frac{3 \text{ in}}{50 \text{ mi}}$

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

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

$\frac{5}{70}$

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?

$\frac{6.5\text{ in}}{13\text{ ft}}$ (÷1) $\frac{1\text{ in}}{2\text{ ft}}$

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

$\frac{1\text{ in}}{2\text{ ft}} \cdot \frac{1\text{ in}}{24\text{ in}}$ (×24, ×1)

SF $=$ model $\frac{1}{24}$ x

act 24 x

1:24

Scale:
Mixed units ok (always label)
Simplify answers

SF: Always same unit (scale factor)
...how many times as big...
don't need to label (since always same)

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

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? $\frac{1\text{ ft}}{11.2\text{ ft}}$

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?

$\frac{1}{11.2} \approx 0.09$ 11.2

Scale: Mixed units ok

$\frac{3\text{ ft}}{33\text{ ft }6\text{ in}} = \frac{3\text{ ft}}{33.5\text{ ft}} = \frac{1\text{ ft}}{x}$

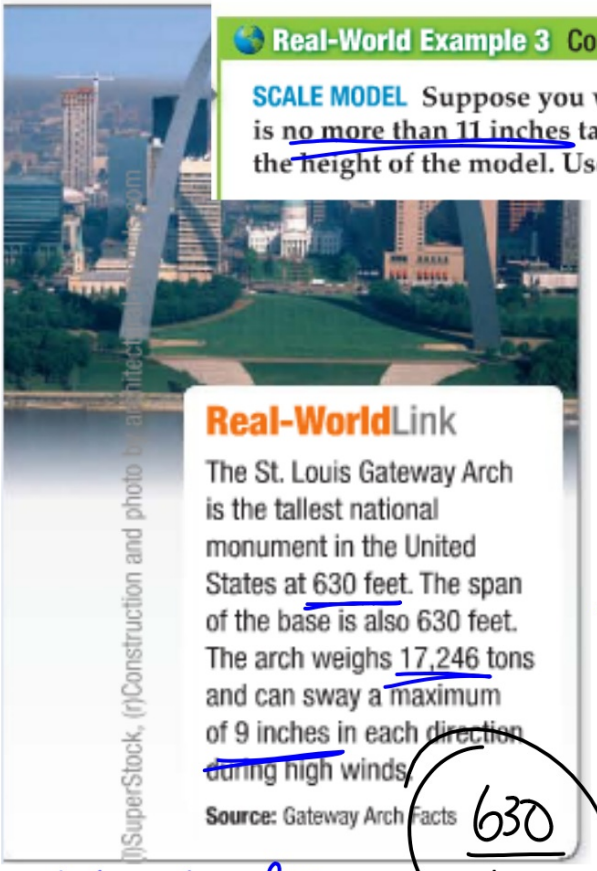
$3x = 33.5$

$x \approx 11.2$

(scale factor...same unit)

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.



(l)SuperStock, (r)Construction and photo by architect.com

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

$1 \text{ in} = 60 \text{ ft}$

$\frac{630}{11} \approx 57.3$

$100 \text{ ft} = 1 \text{ in}$

$\frac{1 \text{ in}}{100 \text{ ft}} = \frac{x}{630}$

$100x = 630$

$x = 6.3$

$\frac{1 \text{ in}}{150 \text{ ft}} = \frac{x}{630}$

4.2

$\frac{1 \text{ in}}{75 \text{ ft}} = \frac{x}{630}$

$x = 8.4$

- ~~Proportion~~
- 1 inch = ???

Maybe guess & check at first

- use friendly numbers for scale (bec. you are building it)
- has to fit in 11 inches

$\frac{1 \text{ in}}{60 \text{ ft}} = \frac{x}{630}$ $x = 63$

$x = 10.5$

P. 521

5-16 all

31-49 odd