

Scale Drawings Notes

(SOL: 6.1/7.4/7.6)

Name: Key Date: _____

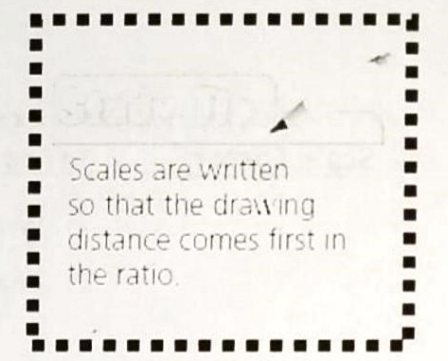
A **SCALE DRAWING** is a diagram/map/model of an object that is too large or too small to draw. The dimensions are proportional to the actual dimensions (distances) of the real-life example. **Maps, blue prints, floor models are some examples.*

The **SCALE** on a scale drawing is the ratio of the drawing lengths or model to its corresponding actual lengths.

"1 in: 12 ft" means that 1 inch in the model represents an actual distance of 12 ft.



"Scale" dimensions in the scale drawing.



To find the actual distance from a scale drawing, use the scale to write a proportion and solve.

Example 1: On a map of Florida, the distance between Coral Springs and Fort Lauderdale is about 4.1 centimeters.

The scale on the map is **1 centimeter = 4.5 km**
What is the actual distance?

$$\frac{1 \text{ cm}}{4.5 \text{ km}} = \frac{4.1 \text{ cm}}{x}$$

$$x = 18.45 \text{ km}$$

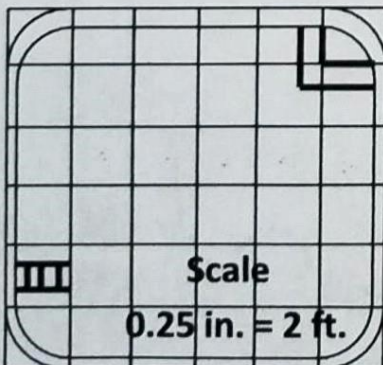
Example 2: On a map of North Carolina, the distance between Raleigh and Charlotte is $3\frac{1}{4}$ inches.

The scale on the map is **1 inch = 40 miles**. What is the actual distance?

$$\frac{1 \text{ in}}{40 \text{ mi}} = \frac{3.25 \text{ in}}{x \text{ mi}}$$

$$x = 130 \text{ mi}$$

Example 3: On the blueprint of the pool, each square has a side length of 0.25 in. What is the actual width of the pool?



$$\frac{0.25 \text{ in}}{2 \text{ ft}} = \frac{1.5 \text{ in}}{x \text{ ft}}$$

6 sq's at 0.25 in = 1.5 in

$$0.25x = 3$$

$$x = 12 \text{ ft}$$

Example 4: A designer has made a scale drawing of a living room for one of her clients.

The scale of the drawing is 1 inch = $1\frac{1}{3}$ feet. On the drawing, the sofa is 6 inches long. **Find the actual length of the sofa.**

$$1\frac{1}{3} = \frac{4}{3}$$

$$\frac{1 \text{ in}}{\frac{4}{3} \text{ ft}} = \frac{6 \text{ in}}{x \text{ ft}}$$

$$x = 2\frac{2}{3} = 8 \text{ ft}$$

Example 5: Inside the Lincoln Memorial, the chamber that features the marble statue of Abraham Lincoln has a height of 60 feet. Suppose a scale model of the chamber has a height of 4 in.

What is the scale of the model?

$$\frac{60 \text{ ft}}{4 \text{ in}} \rightarrow \frac{15 \text{ ft}}{1 \text{ in}}$$

$$\text{Scale} = 1 \text{ in} : 15 \text{ ft}$$

Scale Factor

To find the scale factor for scale drawings and models:

- 1) Write the scale as a **ratio**, showing the scale length to the actual length;
- 2) Change the lengths to **the same unit of measurement** and then drop it;
(Usually convert the bigger unit to the smaller unit.)
- 3) **SIMPLIFY!**

a) Suppose a scale model has a scale of 2 inches = 3 feet. What is the **scale factor**?

$$\frac{2 \text{ in}}{3 \text{ ft}} \rightarrow \frac{2 \text{ in}}{36 \text{ in}} \rightarrow \frac{1}{18} = \text{SF}$$

12 in per ft

b) Suppose the scale is 2 inches = 4 yards. What is the **scale factor**?

$$\frac{2 \text{ in}}{4 \text{ yds}} \rightarrow \frac{2 \text{ in}}{12 \text{ ft}} \rightarrow \frac{2 \text{ in}}{144 \text{ in}} \rightarrow \frac{1}{72} = \text{SF}$$

3 ft per yd 12 in per ft

Jacob has made a scale drawing of his yard. The scale of the drawing is 1 centimeter = 0.5 meter.

1. The length of the patio is 4.5 centimeters in the drawing. **Find the actual length.**

$$\frac{1 \text{ cm}}{0.5 \text{ m}} = \frac{4.5 \text{ cm}}{x \text{ m}}$$

$$x = 2.25 \text{ m}$$

2. The actual distance between the water faucet and the pear tree is 11.2 meters. Find the corresponding distance on the drawing.

$$\frac{1 \text{ cm}}{0.5 \text{ m}} = \frac{x \text{ cm}}{11.2 \text{ m}}$$

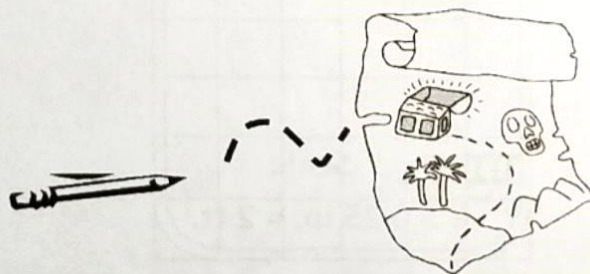
$$11.2 = 0.5x$$

$$22.4 \text{ cm} = x$$

3. Find the scale factor for the drawing.

$$\frac{1 \text{ cm}}{0.5 \text{ m}} \rightarrow \frac{1 \text{ cm}}{50 \text{ cm}} \rightarrow \frac{1}{50} = \text{SF}$$

100 cm per m



Scale Drawings & Models- HOMEWORK

(SOL:6.1/7.4/7.6)

For questions # 1-3, use the following information.

The local school district has made a scale model of the campus of Engels Middle School including a proposed new building. The scale of the model is **1 inch = 3 feet**.

1. An existing gymnasium is 8 inches tall in the model. How tall is the actual gymnasium?

$$\frac{1 \text{ in}}{3 \text{ ft}} = \frac{8 \text{ in}}{x \text{ ft}}$$

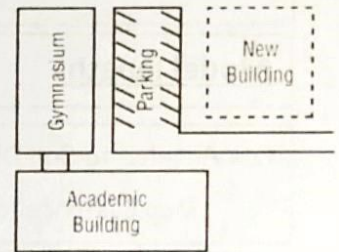
$$x = 24 \text{ ft}$$

2. The new building is 22.5 inches from the gymnasium in the model. What will be the actual distance from the gymnasium to the new building if it is built?

$$\frac{1 \text{ in}}{3 \text{ ft}} = \frac{22.5 \text{ in}}{x \text{ ft}}$$

$$x = 67.5 \text{ ft}$$

View of Campus from Above



3. What is the scale factor of the model?

$$\frac{1 \text{ in}}{3 \text{ ft}} \rightarrow \frac{1 \text{ in}}{36 \text{ in}} \rightarrow \frac{1}{36} = \text{SF}$$

4. On a map, two cities are $5\frac{3}{4}$ inches apart. The scale of the map is $\frac{1}{2}$ inch = 3 miles. What is the actual distance between the towns?

$$\frac{5.75 \text{ in}}{x \text{ mi}} = \frac{0.5 \text{ in}}{3 \text{ mi}}$$

$$17.25 = 0.5x$$

$$34.5 = x \text{ mi}$$

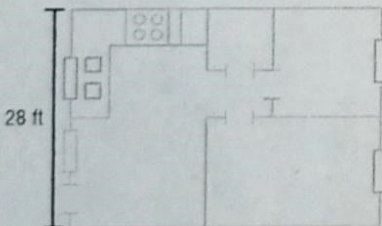
5. The bed of Jerry's pickup truck is 6 feet long. On a scale model of the truck, the bed is 8 inches long. What is the scale of the model?

$$\frac{6 \text{ ft}}{8 \text{ in}} \rightarrow \frac{3 \text{ ft}}{8 \text{ in}}$$



8 in equals 3 ft

6. Marta is making a scale drawing of her apartment for a school project. The apartment is 28 feet wide. On her drawing, the apartment is 7 inches wide. What is the scale of Marta's drawing?



$$\frac{7 \text{ in}}{28 \text{ ft}} \rightarrow \frac{7 \text{ in}}{336 \text{ in}} \rightarrow \frac{1}{48}$$

$$1:48 = \text{SF}$$

7. The smallest spider, the *Patu marples* of Samoa, is 0.43 millimeter long. A scale model of this spider is 8 centimeters long. What is the scale of the model?

$$\frac{0.43 \text{ mm}}{8 \text{ cm}} \rightarrow \frac{43 \text{ cm}}{8 \text{ cm}}$$

10 mm per cm

What is the scale factor of the model? 1:48

Which of the following represents a proportional relationship?

A. $\frac{2}{3} = \frac{8}{12}$ ✓

B. $\frac{3}{4} = \frac{4}{5}$

C. $\frac{3}{5} = \frac{6}{7}$

D. $\frac{5}{6} = \frac{4}{5}$

*Review 8) Estimate $-\sqrt{118}$ to the nearest whole number.

Find the length/distance for each example given. Be sure to include units!

Actual lengths	Scale	Model length
A garage door that is 16 feet wide.	2 inches: 1 foot	32 in
A surgical instrument is 150 millimeters long.	1 mm : $\frac{1}{2}$ cm	75 mm
A lake is 85 feet across (diameter).	1 in : 4 feet	21.25 in
Model lengths		Actual length
Los Angeles to San Diego, California Map Distance: 6.35 cm	1 cm : 20 mi	127 mi
Chicago Illinois to Mexico City, Mexico Map Distance: 10.9 cm	1 cm : 250 km	2725 km

Multiple Choice You decide to use a scale of 1 in. : 8 ft to make a scale drawing of your classroom. If the actual length of your classroom is 36 feet, what should the length of the classroom in the drawing be?

$$\frac{1 \text{ in}}{8 \text{ ft}} = \frac{x \text{ in}}{36 \text{ ft}}$$

$$45 \text{ in} = x$$

- A. 1 in. B. 4.5 in. C. 36 in. D. 288 in.

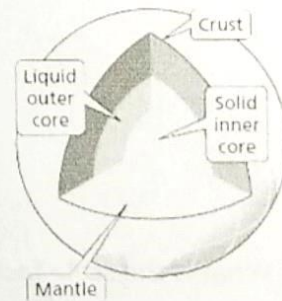
Multiple Choice A child's picnic table is a scale model of an adult picnic table. The child's picnic table is 22 inches tall, and the adult picnic table is 33 inches tall. What is the model's scale?

$$\frac{22 \text{ in}}{33 \text{ in}} = \frac{2}{3}$$

- F. 1:22 G. 1:15 H. 1:1.5 I. 1:1

The liquid outer core of Earth is 2300 kilometers thick. A scale model of the layers of Earth has a scale of 1 in. : 500 km. How thick is the liquid outer core of the model?

- A. 0.2 in. B. 4.6 in. C. 0.2 km D. 4.6 km



$$\frac{2300 \text{ km}}{x} = \frac{500 \text{ km}}{1 \text{ in}}$$

$$46 = x$$