

Scale Factor and Scale Drawings

When looking at a map, the scale of the map tells us how to figure out actual distances.

We do this by measuring the distance on the map, and use the scale to convert it to the actual distance.

SCALE MODELS AND SCALE DRAWINGS CAN BE SET UP USING PROPORTIONS

EXAMPLE:

On a map, if 4 inches represents 15 miles
What does 10 inches represent?

$$\begin{array}{l} \text{inches} \\ \hline 4 \\ \text{miles} \end{array} = \begin{array}{l} 10 \\ \hline x \\ \text{miles} \end{array}$$

Solve to get 37.5 mi

$$\begin{array}{r} 4x = 150 \\ \hline 4 \quad 4 \\ x = 37.5 \text{ mi.} \end{array}$$

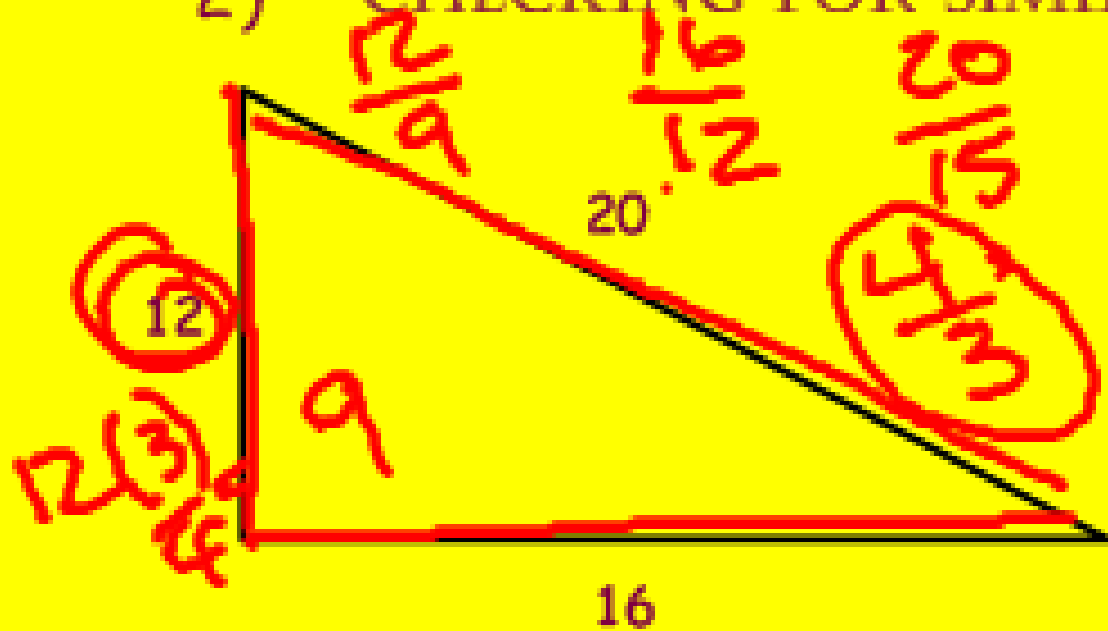
**SIMILAR FIGURES HAVE THE SAME SHAPE
BUT A DIFFERENT SIZE**



Let's review what we know
about similar figures and how
that relates to scale factor.



2) CHECKING FOR SIMILAR TRIANGLES



Check each pair of ratios to see if they are equal

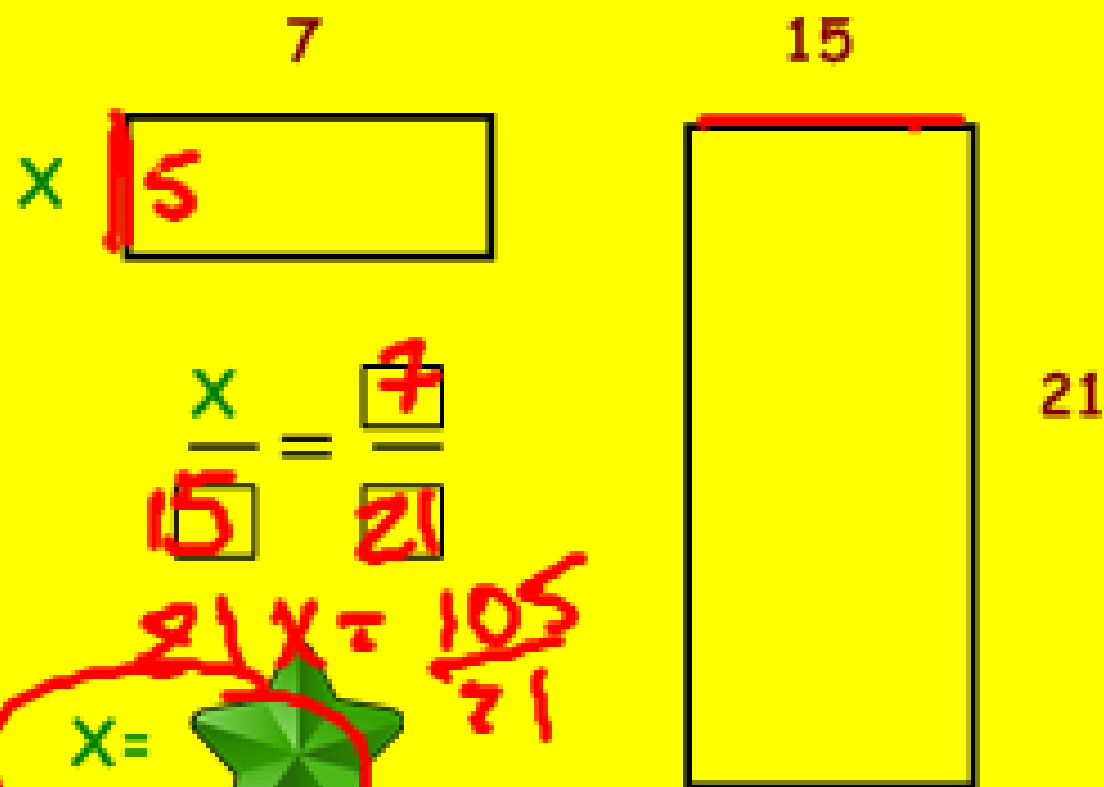
If they are, the triangles are similar \sim



$$\frac{9}{12} = \frac{3}{4} = \frac{15}{20} \quad \frac{12}{16}$$

So the ratio of the sides is $4:3$ if we go from the large triangle to the small triangle or $3:4$ if we go from the small triangle to the large triangle. We can also call this the scale factor.

3) Set up proportions to find the missing part of the similar shapes



What is the scale factor going from the small rectangle to the large rectangle?

$$\frac{21}{7} = \frac{3}{1}$$

large
Small

What is the scale factor going from the small rectangle to the large rectangle?

Small

$$\frac{1}{3}$$

4) Matchbox cars are usually made in a scale 1:64. If a matchbox Camaro is 3 inches, how long is an actual Camaro?

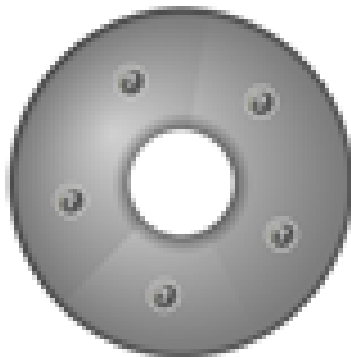
$$3(64) = 192 \text{ in}$$

A 15 feet

B 21 inches

C 192 inches

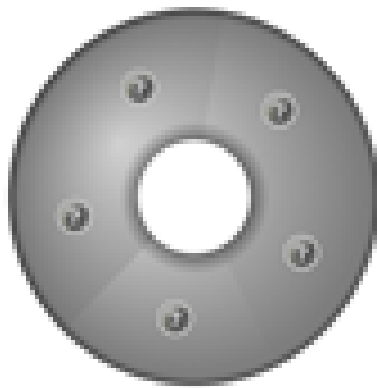
$$\frac{192}{12} = 16 \text{ ft}$$



$\frac{305\text{ft}}{4.25\text{in}}$

5) If my model of the Statue of Liberty is 4.25 inches tall, and the actual statue is 305 feet tall, then what is the scale factor from the model to the actual?

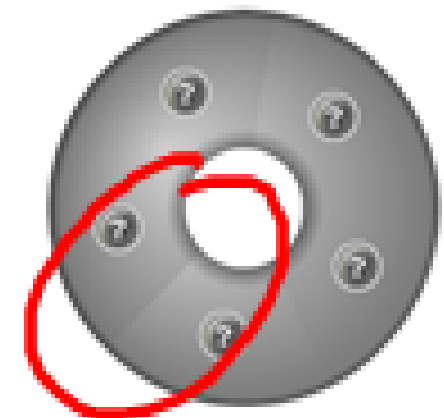
- A 1296.25 $\frac{71.76\text{ft}}{1\text{in}}$
- B 71.76
- C .0139



$$\frac{3.625 \text{ in}}{x} = \frac{1 \text{ in}}{293.2 \text{ ft}}$$

If my model of the Eiffel Tower is 3.625 inches tall, and the scale is 1 in = 293.2 feet. What is the height of the actual Eiffel Tower? Round to the nearest foot.

- A 972 feet
- B 986 feet
- C 1063 feet



7) What is the scale factor of a model sailboat if the scale is 1 inch = 6 feet?



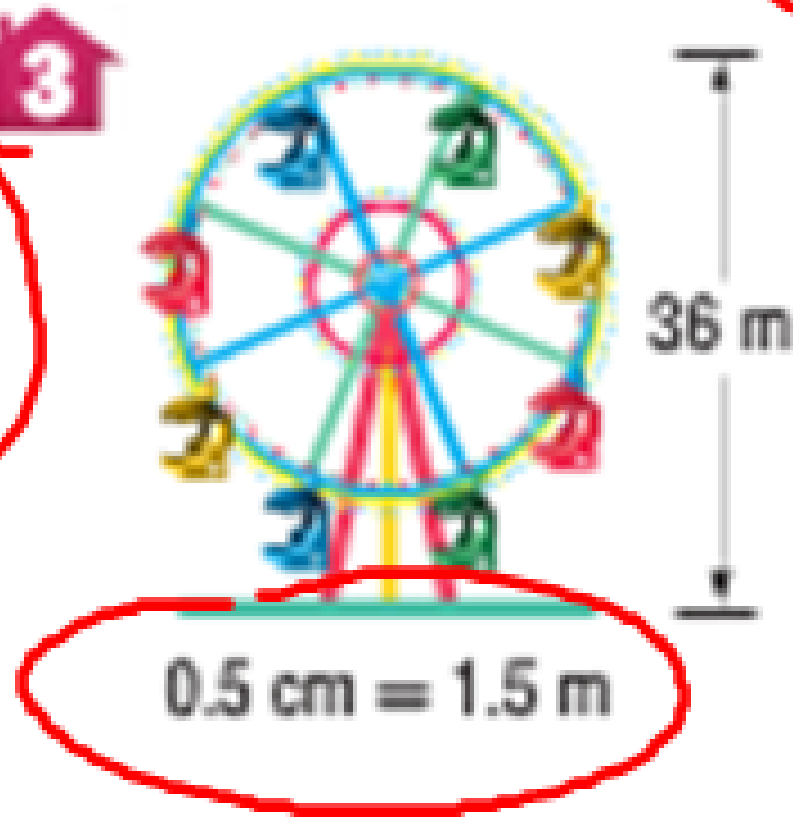
$$\frac{1 \text{ in}}{6 \text{ ft}}$$

$$6(12) = 72 \text{ in}$$

1 in to 6 ft

Find the length of each model & the scale factor

$$\frac{12}{3600} = \frac{1}{300}$$



$$\frac{.5 \text{ cm}}{1.5 \text{ m}} = \frac{12 \text{ cm}}{36 \text{ m}}$$

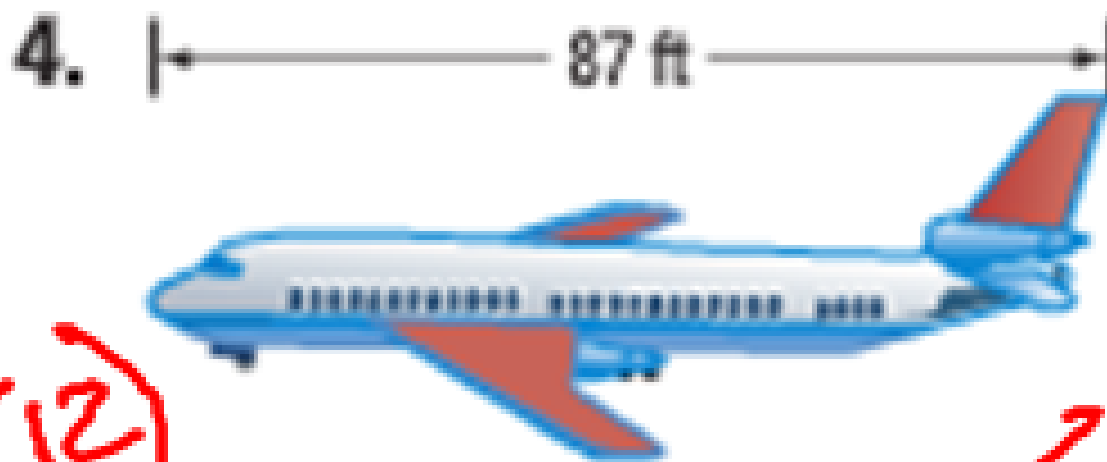
~~.5 (36) = 1.5~~

$$x = \frac{12 \text{ cm}}{3600}$$

36 m 4012 cm

3600 cm -

Find the length of each model & the scale factor



$$\frac{2 \text{ in}}{180 \text{ in}} = \frac{1}{90}$$

2 in. = 15 ft

$$\frac{2 \text{ in}}{15 \text{ ft}} = \frac{x}{87 \text{ ft}}$$

$$15x = 174$$
$$x = 11.6 \text{ in}$$