Lesson 7.5 revised.notebook

January 21, 2020

7.5

Understanding Scale Drawings

Lesson Objectives

- Identify the scale factor in diagrams.
- Solve problems involving scale drawings of geometric figures.

Vocabulary

scale
scale factor
What is scale?

The scale gives the ratio that compares the measurements of a drawing or model with the actual measurement of the corresponding sides.

What is scale factor?

A scale factor is the multiplier that tells you how to get the corresponding lengths in similar figures.
What does it mean when I say that the hot wheels car is proportional to the original?

1:64 (scale) cm cm

Scale factor \( SF = 64 \)
What makes these triangles similar?

We’re so similar!

\[ \text{sf } R \rightarrow B = 3 \]
\[ \text{sf } B \rightarrow R = \frac{1}{3} \]

reciprocals

same shape, diff size
Guided Practice

Calculate the scale factor.

1 In the diagram, trapezoid B has been enlarged to produce trapezoid A. Find the scale factor.

Length of A = \_\_ cm
Length of B = \_\_ cm

\[
\text{Scale factor} = \frac{\text{Scaled length}}{\text{Original length}}
\]
\[
= \frac{?}{?}
\]
\[
= ?
\]

\[\text{sf } B \rightarrow A = \frac{7.8}{2.6} = 3\]

\[\text{sf } A \rightarrow B = \frac{1}{3}\]
"I don't get it. According to this map, we only have to drive $8 \frac{1}{2}$ inches."
Example 15  Calculate an actual distance from the scale of a map.

The scale of a map 1 inch : 25 miles. If the length of Whitley Road on the map is 4.4 inches, find the actual length of Whitley Road, in miles.

\[
\frac{1\text{ in}}{25\text{ mi}} = \frac{4.4\text{ in}}{w} \\
4.4(25) = 110\text{ mi}
\]
Example 16 Calculate the distance on a map from the original distance.

The actual distance between Mr. Herd’s office and his home is 120 miles. A map that shows his office and his home uses the scale 1 inch : 50 miles. How far apart on the map are Mr. Herd’s office and his home?

\[
\frac{1 \text{ in}}{50 \text{ mi}} = \frac{H}{120 \text{ mi}}.
\]

\[
50H = 120
\]

\[
H = \frac{120}{50} = 2.4 \text{ in}
\]
Example 17 Calculate the actual length from a scale drawing.

An S scale (or S gauge) model train is a scaled model of an actual train. All the cars are built on a scale of \(1:64\). The length of an S scale locomotive is 8 inches long. The length of an S scale coal tender is 5 inches. Find the actual lengths of the locomotive and the coal tender in feet. Round your answer to the nearest tenth.

\[
\begin{align*}
\text{LOCO} & \quad \frac{1\text{ in}}{64\text{ in}} = \frac{8\text{ in}}{L} \\
& \quad L = \frac{8 \times 64}{12} \\
& \quad L = 512 \text{ in} \\
& \quad L = 42.666 \ldots \text{ ft.}
\end{align*}
\]

\[
\text{CT} \quad \frac{1}{64} = \frac{5}{C} \\
\quad C = \frac{5 \times 64}{12} \\
\quad C = 26.666 \ldots \text{ ft.}
\]
Guided Practice

Complete.

2. The scale of a map is 1 inch : 15 miles. If the distance on the map between John's home and his school is 0.6 inch, find the actual distance in miles.

\[
\frac{1}{15} : \frac{0.6}{x} \Rightarrow x = 15 \times (0.6) = 9 \text{ mi}
\]

3. The actual distance between Boston and New York is 220 miles. The scale on a particular map is 1 inch : 25 miles. How far apart on the map are the two cities?

\[
\frac{1}{25} = \frac{y}{220} \Rightarrow 25y = 220 \quad \Rightarrow \quad y = 8.8 \text{ in.}
\]

4. A model car is built using a scale of 1 : 16. The length of the model car is 12 inches. Find the actual length of the car in feet.

\[
\frac{1}{18} = \frac{12}{c} \Rightarrow 216 = 12 \times 18 \Rightarrow c = 18 \text{ ft.}
\]

\[
C = 12 \times 18 = 216 \text{ in.}
\]