Date _____ Foundations Math 11

8.3 Scale Diagrams

A scale diagram is a reproduction of an object. It is either larger or smaller than the original, but it has the proportional side lengths (ie. It is similar). Each dimension of the figure is multiplied by the same scale factor.

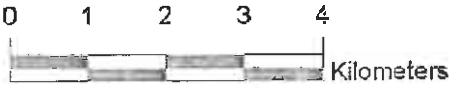
Scales can be stated several ways:

As an equation eg. 1 cm = 50 km

As a rate eg. $\left(\frac{1\ cm}{50\ km}\right)$

As a ratio eg. (1: 5 000 000)

As a picture (legend) eg.

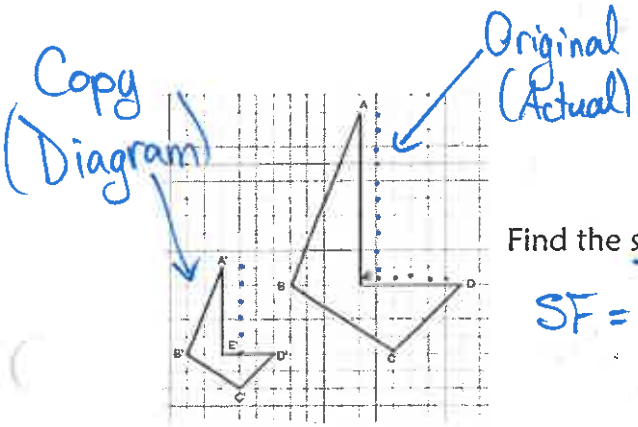


If the image length is larger than the object length then the scale factor is greater than 1 and we have an enlargement.

If the image length is smaller than the object length then the scale factor is less than 1 and we have a reduction.

Scale is ALWAYS written in the form of:

$$\frac{\text{Diagram}}{\text{Actual}}$$



Find the scale factor from the diagram:

$$SF = \frac{\text{Diagram}}{\text{Actual}} = \frac{A'E'}{AE} = \frac{5}{10} = \frac{1}{2}$$

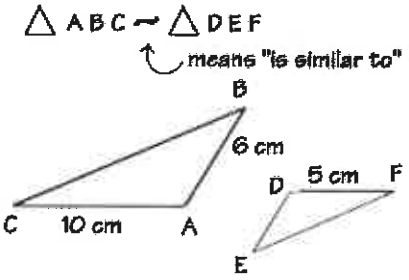
Check SF with another length.

Length of DE = 6

$$\frac{D}{A} = \frac{1}{2} = \frac{D'E'}{6}$$

D'E' = 3 ✓

These two triangles are similar. Find the length of DE.



Similar sides: $\frac{AB}{DE} = \frac{AC}{DF}$ → proportions are equal

$\frac{6}{DE} = \frac{10}{5}$ $\quad DE = \frac{6(5)}{10} = 3\text{cm}$

Surveyors are using a measuring device called a tight-chain to determine boundaries of plots of land. Two surveyors determine that a proposed building site is rectangular, measuring 175 m x 50 m. To make a scale drawing of the site, they use a scale of 1 : 2500.

What are the dimensions of the scale drawing of the building site in **centimetres**?

Actual: 175m, 50m

Diagram: 7cm, 2cm

$\frac{D}{A} \rightarrow \frac{1}{2500} = \frac{x}{175\text{m}}$

$x = 0.07\text{m}\left(\frac{100\text{cm}}{\text{m}}\right)$

$= 7\text{cm}$

$\frac{1}{2500} = \frac{x}{50}$

$x = 0.02\text{m}\left(\frac{100\text{cm}}{\text{m}}\right)$

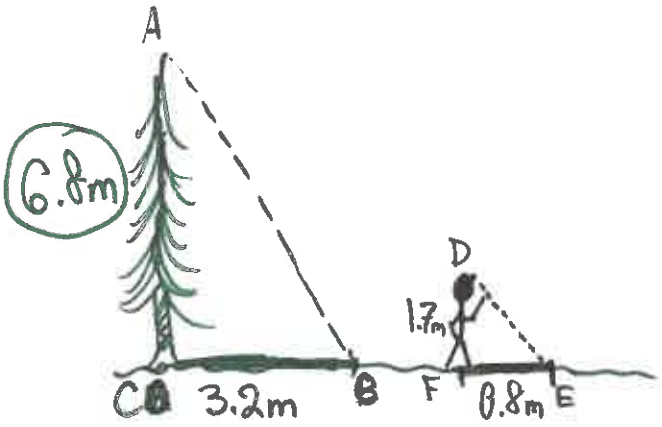
$= 2\text{cm}$

A doll house is $\frac{1}{10}$ of the actual size of a house. If a chair in the dollhouse is 2.75 cm tall, how tall is the actual chair that it models?

$\frac{D}{A} \rightarrow \frac{1}{10} = \frac{2.75\text{cm}}{x}$

$x = 27.5\text{cm}$

Ex. A tree casts a shadow 3.2 m long. At the same time a 1.7 m tall man standing near the tree casts a shadow 0.8 m long. Determine the height of the tree to the nearest tenth.



$\frac{BC}{EF} = \frac{AC}{DF}$

$\frac{3.2\text{m}}{0.8\text{m}} = \frac{AC}{1.7\text{m}}$

$AC = 6.8\text{m}$

Page 479: 1-4, 6, 13, 14